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DEVELOPMENT OF WATER RESOURCES IN APPALACHIA MAIN REPORT. PART --ETC(U)
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1 OF 6

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Development of WATER RESOURCES in APPALACHIA

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MAIN REPORT
PART II
SUB-REGIONAL PLANS
CHAPTERS 7 thru 10

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WATER SUB-REGIONS
D and E
covering portions of
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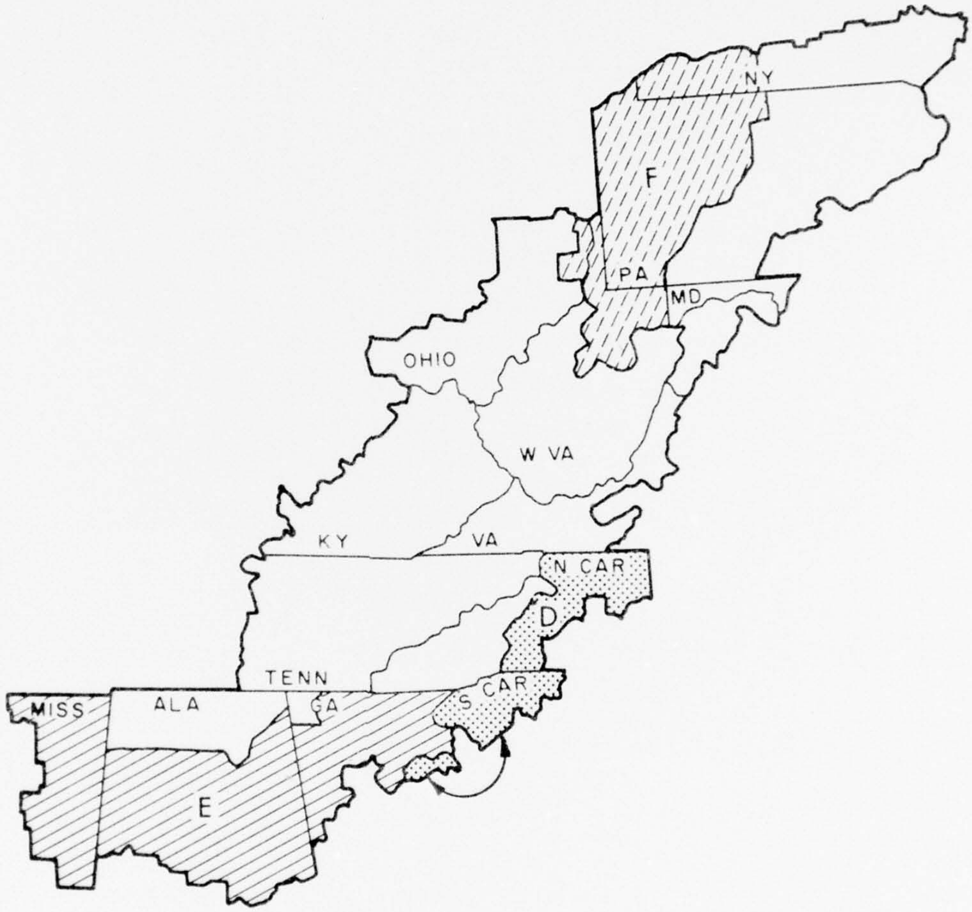

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IN REPLY REFER TO:

TO: THE READER

This volume ~~(Number 4)~~ is the second of three that comprise Part II, "Sub-Regional Plans," to the Main Report for Development of Water Resources in Appalachia. The volume contains six of the 20 chapters that make up Part II. Chapters 7 and 8 present information on Sub-Region "D" in central North Carolina and small portions of South Carolina and Georgia; Chapters 9 and 10 cover Sub-Region "E", which embraces central Alabama, northeastern Mississippi, and northwestern Georgia. Chapters 11 and 12, Sub-Region "F" cover western Pennsylvania, and small portions of New York, Ohio and West Virginia.

The first chapter of each pair presents physical and economic conditions in the sub-region today as well as estimates of the potential for future development and the role water may play. The second chapter contains a definition of the water related needs and the evolution of a water resources plan of development to meet those needs. The plan presented generally contains both structural and non-structural elements as well as future studies that will be required after anticipated growth trends begin to be realized.

The Summary Report (Part I, Volume 1) should be consulted for recommendations made concerning specific elements in the water resources plan presented in the even numbered chapters in this volume. A volume index for the Main Report and its nine supporting Appendices is included on the next two pages for your convenience.

JOHN C. H. LEE, JR.
Colonel, Corps of Engineers
Director

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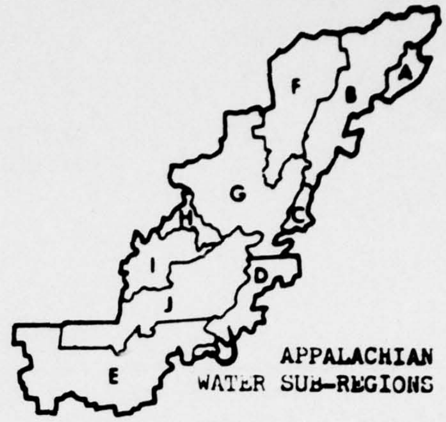
DEVELOPMENT OF WATER
RESOURCES IN APPALACHIA



APPALACHIAN
WATER SUB-REGIONS

VOLUME INDEX

MAIN REPORT

REPORT
For
DEVELOPMENT FOR WATER
RESOURCES IN APPALACHIA

VOLUME INDEX

MAIN REPORT (cont'd)

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		15	Logan Reservoir
		16	Midland Local Protection Project
11	III	17	Upper French Broad System (TVA)
		18	Yellow Creek Port (TVA)
		19	Otocsin (Pa.)
		20	Naturealm (Pa.)
12	IV	-	Concepts & Methods
13	V	-	State Water Supplements: Ala., Ga., Ky., Md., Miss., N.Y., N.Car.
14	V	-	State Water Supplements: O., Pa., S.Car., Tenn., Va., W.Va.
15	VI	-	History, Coordination & Cooperation

APPENDICES

Volume Number	Appendix Designation	Title
16	A	Agriculture, Forestry and Conservation
17	B	Power Supply and Requirements
18	C	The Incidence and Formation of Mine Drainage Pollution
19	D	Water Supply and Water Pollution Control
20	E	Economic Base Study
21	F	Recreation and Aesthetics
22	G	Fish and Wildlife Resources
23	H	Ground Water
24	I	Mineral Industry Resources and Water Requirements

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PREFACE

RELATION OF PART II (VOLUMES 3, 4 and 5) TO OTHER REPORT COMPONENTS

The principal planning and economic aspects of this study are found in the first four parts of the Main Report and throughout a number of appendices. Part I, "Summary Report," presents the overall development plan of the Appalachian Region as a whole and outlines the specific courses of action required to attain it. Part II (this Part) provides a detailed analysis, in two chapters per water sub-region, of the facts and their weighting that led to development of the plan.

Part III, "Project Analyses," presents detailed information on each recommended project concerning hydrologic, hydraulic, structural characteristics and costs as well as benefits, cost allocations and apportionment.

Specific methodology for measuring the impact of public water resource investments is contained in Part IV, "Planning Concepts and Methods." In Part IV some of the methods and techniques used in plan development are discussed in terms of the research undertaken by the Office of Appalachian Studies to assist in better analysis of the effects of public investment in water resources.

In summary, Part II furnishes the basic economic and physical data used in the planning process and tells how they are combined to arrive at the basis for planning decisions. In this Part the physical characteristics (in terms of engineering concepts) and the economic conditions of the sub-regions are reviewed and estimates made of the potentials for development and the role water may hold. This process leads to a statement of the needs which spring from development of the regional potential, and which the sub-regional plan may fulfill.

SOURCES OF DATA

Sources of data are mentioned throughout the report but it is appropriate to mention several principal sources here. The state development plans in many instances proved the best source of data on current state economic objectives for each region and sub-region. The Appalachian Regional Commission has summarized these plans. Their summary, State and Regional Development Plans in Appalachia, 1968 (December 1967), serves as a guide to the State reports but is not a substitute for them. The Appalachian Data Book, June 1967, also by the Appalachian Regional Commission, is a convenient source for basic economic and social data organized for the 63 State Planning Sub-Regions. The Appalachian Industry Location Studies Program, which was undertaken by Fantus Area

Research for the Appalachian Regional Commission, has furnished much information on twenty-five industries expected to have a significant potential for growth in the region and for which often multiple location opportunities are present. The Preliminary Analysis for Economic Development Plan produced by Litton Industries for the Commission also was used as a source material.

The planning process, as carried out by the action offices, produced the physical data and a wealth of economic data which, together with the field surveys undertaken directly by the Office of Appalachian Studies, became a basic source for this Part.

⑥

REPORT FOR DEVELOPMENT

OF

WATER RESOURCES IN APPALACHIA

Main Report.

Part II. Volume 4a.

PART II - SUB-REGIONAL PLANS. Chapters 7 thru 10.

VOLUME 4

CHAPTERS:

7 and 8 - SUB-REGION "D" - NORTH CAROLINA, SOUTH CAROLINA AND GEORGIA

9 and 10 - SUB-REGION "E" - GEORGIA, ALABAMA AND MISSISSIPPI

11 and 12 - SUB-REGION "F" - NEW YORK, PENNSYLVANIA, OHIO, AND WEST VIRGINIA

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⑫ 410p.

Office of Appalachian Studies

Corps of Engineers

⑪ November 1969

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DEVELOPMENT
OF
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IN
APPALACHIA

MAIN REPORT
PART II
SHAPING A PLAN

CHAPTER 7 - WATER SUB-REGION D TODAY

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CHAPTER 7
WATER SUB-REGION D

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CHAPTER 7 - WATER SUB-REGION D TODAY

SECTION I - THE REGION TODAY

1. POLITICAL

Sub-region D (See Figure 7-1) is comprised of 23 counties, of which 14 are in North Carolina, 6 are in South Carolina and 3 in the state of Georgia. The six counties in the state of South Carolina are all of that state that is classified as Appalachia. The sub-region lies across the headwaters of the Yadkin Pee-Dee, the Catawba, the Broad, the Savannah and the Oconee Rivers, all of which drain southeastward into the Atlantic Ocean. A portion of the northern part of the sub-region is drained by the headwaters of the New River, a tributary of the Kanawha, which is a part of the Ohio River Basin.

Some of the cities lying within and immediately adjacent to the sub-region are: Winston-Salem, Greensboro, and Charlotte, North Carolina; Greenville, Spartanburg, Anderson, and Gaffney, South Carolina; and, Athens, and Atlanta, Georgia.

Several planning districts have been organized in this sub-region (including more counties than those in Sub-Region D in some cases) and are: the Isothermal Economic Development District located in Rutherford County; the ABC Economic Development District for Burke and Caldwell Counties in North Carolina; the Blue Ridge Economic Development District in Wilkes County, North Carolina; and the Northwest North Carolina Economic Development District for Yadkin and Forsyth Counties. The three Georgia counties are components of the Northeast Georgia Area Planning and Development Commission. Several of the smaller counties are establishing planning authorities of their own. All of the South Carolina Counties are in a single development district.

2. PHYSICAL

Physiography and geology. Water Sub-Region D has an area of 10,670 square miles. The physical features are shown on Figure 7-2. The major portion of the Sub-region, the eastern part, is in the piedmont physiographic province while the extreme western edge is in the Blue Ridge province. Elevation varies from 5075 feet m.s.l. in the Blue Ridge Mountains of Ashe County, North Carolina to about 600 feet m.s.l. in the lower Piedmont of Georgia.

The Blue Ridge province with its high ridges and peaks, and few readily accessible gaps, was a deterrent to early western migration. Transportation routes, in general, developed either eastward from or parallel to the Blue Ridge Mountains which extend in a southwest northeast direction. The sub-surface formations of the area are generally crystalline, of Pre-Cambrian and Paleozoic Age. They are highly metamorphosed and distorted by structural uplift. The eastern edge of the Blue Ridge province is the Blue Ridge escarpment, a major fault, which is also the western boundary of the Piedmont province.

The Piedmont province has a generally rolling land surface of gentle slopes and slight relief. The topography of the land presents adequate sites for industrial and urban expansion. The sub-surface formations of the area vary in age from Pre-Cambrian to recent. In general, they are granite, gneiss, schist, and slate covered by mantle of saprolite.

Value of mineral production in Sub-region D in 1965 was $12.0 million, of which 94 percent was construction materials such as sand and gravel, crushed granite, and dimension granite. Feldspar, barite, and clay were also produced in the Sub-region in 1965.

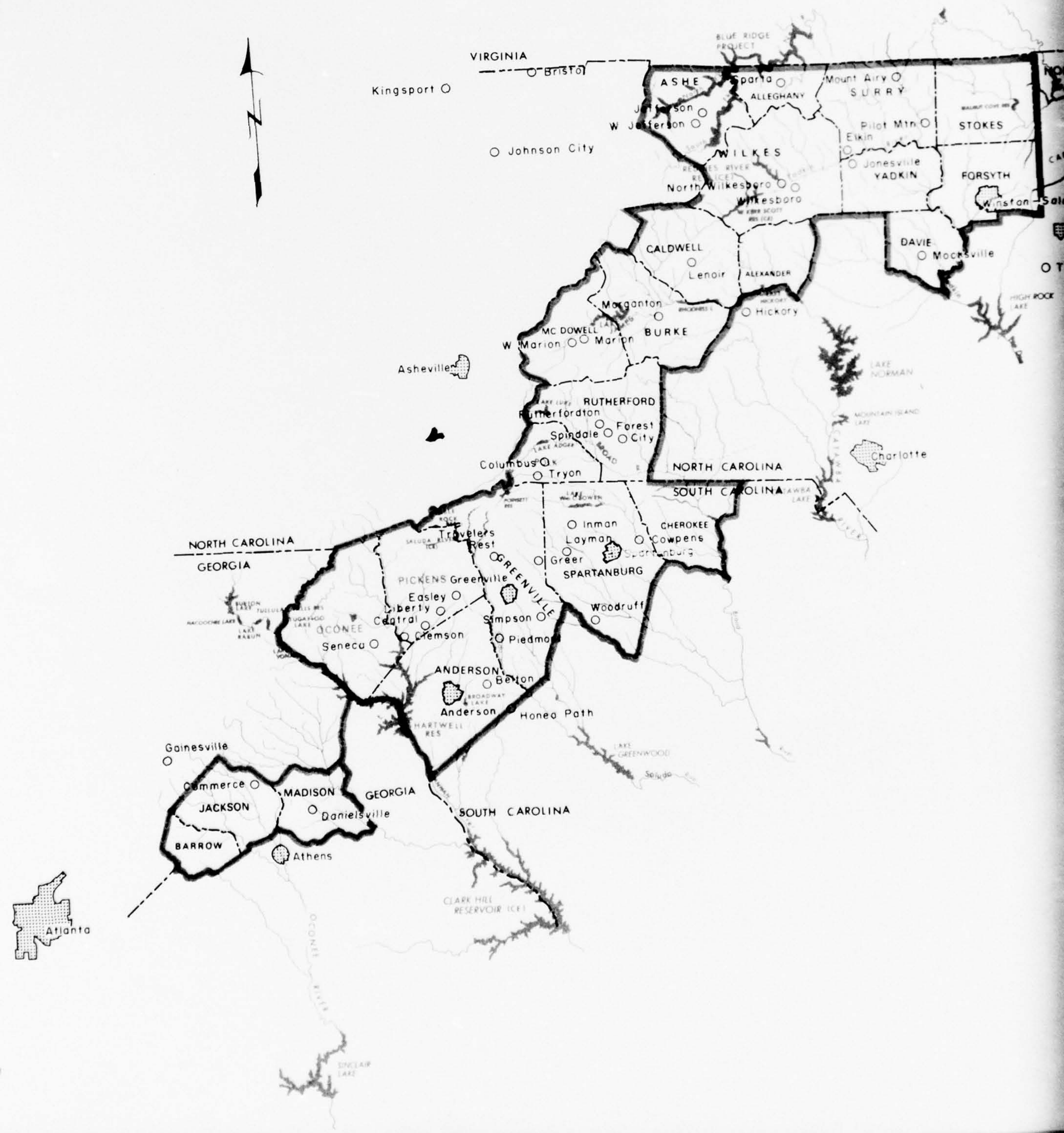
Since most of the streams of the Sub-region have their source in the Blue Ridge province in the western part of the sub-region, most of them are small. This causes problems in water supply as well as pollution. The area is drained by the tributaries of six river systems. These are as follows:

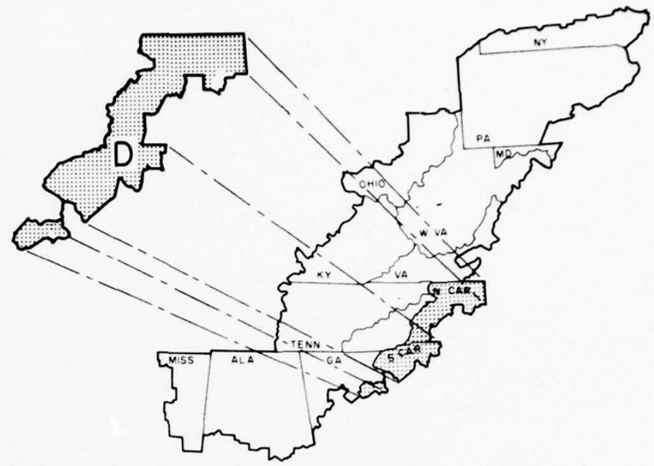
River System	Tributary in Sub-Region D
Ohio	Headwaters of New River
Roanoke	Headwaters of Dan River
Yadkin-Pee-Dee	Nearly all of the Yadkin River
Santee	Headwaters of Catawba, Broad and Saluda Rivers
Savannah	Headwaters of Savannah River and parts of Broad River (Georgia)
Altamaha	Headwaters of Oconee River

A majority of the streams in the Sub-region are steeply sloped and flow on or close to bedrock. Flood plain deposits are generally narrow and shallow. Water quality ranges from very good to excellent with low dissolved solids and sediment contents; therefore, the waters are suitable for consumptive and recreational purposes. Many of the larger tributaries, as well as main rivers, have been dammed. Moderately sized hydroelectric generating plants have been installed in some of these dams. A discussion of existing water resource developments is presented later in this section.

Climate. The climate of Sub-region D is sub-tropical. Sub-zero temperatures are rare and are of very short duration. Maximum summer temperatures are around 90° Fahrenheit. Considerable precipitation, moderate cloudiness and wind movement, and high humidity are general characteristics of the weather in this sub-region. Weather changes are frequent in the winter and tropical hurricanes enter the area in late summer and early fall from the South Atlantic and Gulf Coasts.

Maximum temperatures usually occur during July or August and occasionally may exceed 100 degrees, but not every year. Minimum temperatures for the area occur during December, January, and February and are usually below freezing. Temperatures in the higher elevations may fall below zero.


N
VIRGINIA
Bristol
Kingsport
Johnson City
BLUE RIDGE PROJECT
ASHE
Jefferson
W Jefferson
Sparta
ALLEGHANY
Mount Airy
SURRY
Pilot Mtn
Elkin
STOKES
WILKES
Jonesville
YADKIN
FORSYTH
North Wilkesboro
Wilkesboro
Winston-Salem
CALDWELL
Lenoir
ALEXANDER
DAVIE
Mocksville
HIGH ROCK LAKE
Morganton
Hickory
MC DOWELL
W Marion
Marion
BURKE
Asheville
LAKE NORMAN
MOUNTAIN ISLAND LAKE
RUTHERFORD
Rutherfordton
Forest City
Spindale
Columbus
Tryon
Charlotte
NORTH CAROLINA
SOUTH CAROLINA
Inman
CHEROKEE
Layman
Cowpens
Travelers Rest
Greer
Spartanburg
SPARTANBURG
NORTH CAROLINA
GEORGIA
PICKENS
Greenville
GREENVILLE
Easley
Liberty
Central
OCONEE
Seneca
Clemson
Simpson
Woodruff
Piedmont
ANDERSON
Belton
Anderson
Honea Path
HARTWELL RES
LAKE GREENWOOD
Gainesville
Commerce
MADISON
GEORGIA
JACKSON
Danielsville
SOUTH CAROLINA
BARROW
Athens
CLARK HILL RESERVOIR (CE)
Atlanta
SINCLAIR LAKE



VICINITY MAP

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

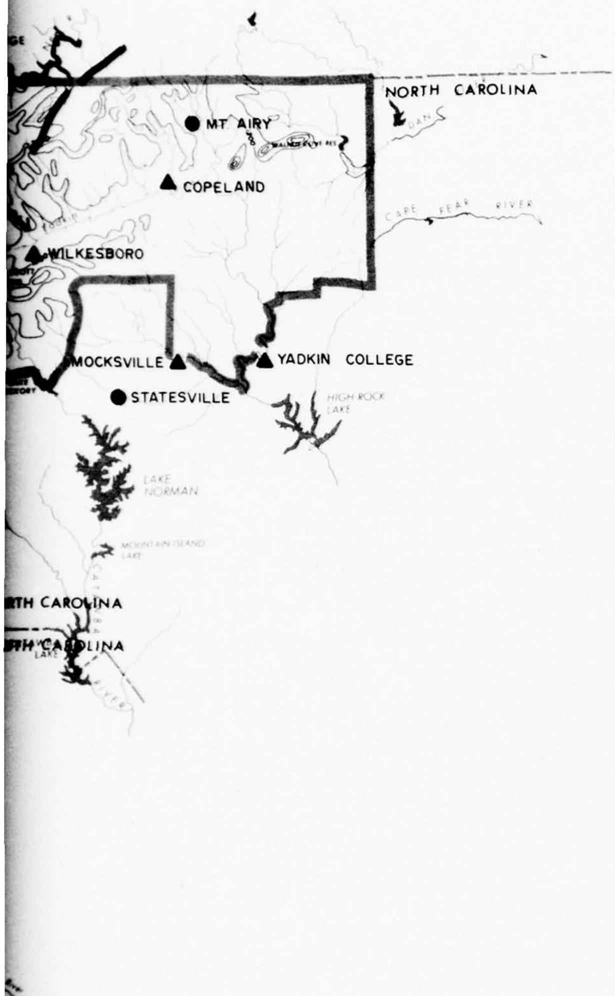
WATER SUB-REGION D

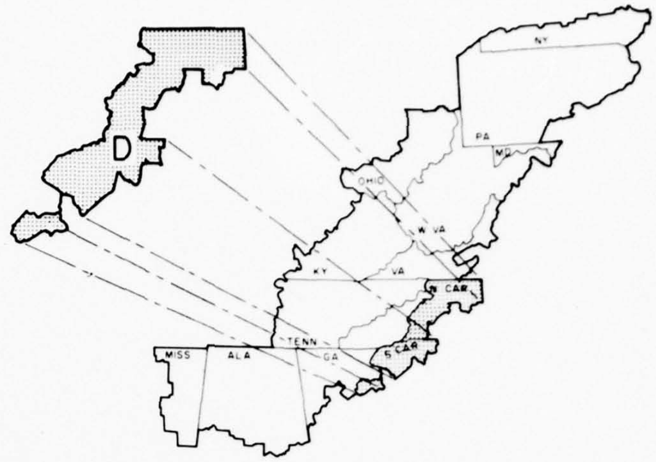
LOCATION MAP

10 5 0 10 20 30 40 50
SCALE IN MILES

OFFICE OF APPALACHIAN STUDIES JUNE 1968


N
VIRGINIA
BLUE RIDGE PROJECT
MT AIRY
COPELAND
WILKESBORO
LENOIR
MOCKSVILLE
YADKIN COLLEG
STATESVILLE
LAKE NORMAN
BLUE RIDGE PROVINCE
PIEDMONT PROVINCE
MARION
CAROLEEN
NORTH CAROLINA
SOUTH CAROLINA
TRYON
GAFFNEY
CAESARS HEAD
NORTH CAROLINA
GEORGIA
CLIFTON
GREENVILLE
PELZER
ENOREE
IVA
LAKE GREENWOOD
GREENWOOD
GEORGIA
SOUTH CAROLINA
CLARK HILL RESERVOIR (CE)
SINCLAIR LAKE





VICINITY MAP

LEGEND

● PRECIPITATION STATIONS

▲ STREAM GAGING STATIONS

— — — PHYSIOGRAPHIC BOUNDARY

Contour interval 600 Feet

10 5 0 10 20 30 40 50

SCALE IN MILES

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB - REGION D

PHYSICAL FEATURES

OFFICE OF APPALACHIAN STUDIES JUNE 1968

II-7-5 FIGURE 7-2

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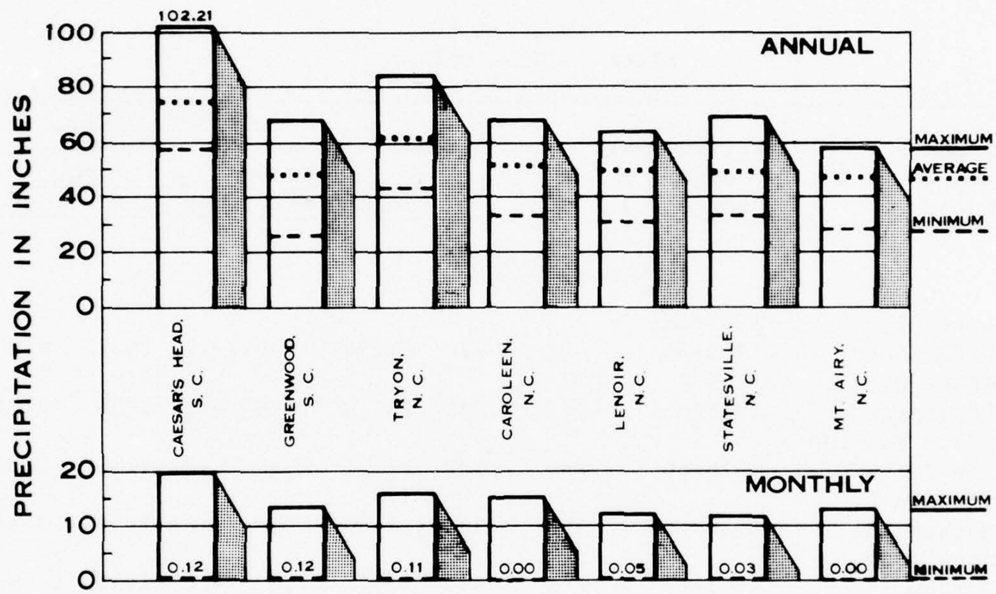
Annual precipitation over the region is about 50 inches, with only a small portion occurring as snow. The rainfall amounts are fairly well distributed throughout the year with the largest amounts falling during the months of March, July and August. Average monthly amounts range from about 5.5 inches in July and August to about 2.9 inches in November. Monthly extremes have ranged from a maximum of 20.00 inches at Caesars Head, South Carolina, to a minimum of zero at several stations. Precipitation data for selected stations are given in the following chart (See Figure 7-2 for station locations)



From studies of past events, it appears that hurricanes, and the tropical storms related thereto, caused the heaviest precipitation. These storms usually occur in late summer and early fall. Extra-tropical storms are not uncommon and occur in both warm and cold months. Sudden and violent thunderstorms, which usually occur in warm weather, can give up to several inches of precipitation, though they are usually highly localized.

Sub-region D snowfall varies widely, from an annual average of about 8.00 inches in North Carolina to less than 4.00 inches in South Carolina. The mountain areas average from about 10 to 20 inches. Seasonal totals of 70 inches or more have been recorded in some of the mountain areas. Single storm totals of 15 inches or more have been recorded.

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Runoff. Runoff from the area encompassed by Sub-region D is collected and conveyed to the Atlantic Ocean by five major river basins, and to the Ohio River by the New River Basin. That portion of Sub-region D that lies in North and South Carolina is drained by the New, Dan, Yadkin-Pee Dee, and Santee River Basins and the portion in Georgia is drained by the Savannah and Oconee River Basins. There is a wide variation of mean daily flows at any given station during a water year; but, none have experienced periods of no flow. There is a seasonal variation of monthly runoff. The winter and early spring months produce the highest runoff, while the lowest runoff occurs during the summer months. Runoff data for stream gaging stations, with 25 or more years of record in the Santee, Yadkin-Pee Dee, and Oconee River Basins are given in the following tabulation.

TABLE 7-1
STREAM GAGING DATA
(WATERYEAR AVERAGES)

Stream and Station	Period of Record	Drainage Area sq. mi.	Av. Annual cfs	Av. Annual Inch	Annual Runoff Max. of Record Year	Annual Runoff Max. of Record Inch	Annual Runoff Minimum of Record Year	Annual Runoff Minimum of Record Inch
NORTH CAROLINA								
Yadkin R.	1903-09							
Wilkesboro	1920-66	493	797	21.94	1907	42.13	1956	9.50
Fisher R.								
Copeland	1931-66	121	180	20.19	1949	28.27	1956	9.83
Yadkin R., Yad-								
kin College	1928-66	2,280	2,907	17.31	1960	28.22	1956	9.03
S.Yadkin R.								
Mocksville	1938-66	313	331	14.35	1960	25.67	1955	8.37
Catawba R.								
Marion	1941-66	171	324	25.72	1949	44.61	1956	13.97
SOUTH CAROLINA								
Broad R.	1896-99							
Gaffney	1938-66	1,490	2,477	22.57	1965	34.89	1956	13.22
Pacolet R.								
Clifton	1939-66	320	497	21.08	1965	34.66	1941	11.41
Enoree R.								
Enoree	1929-66	307	421	18.61	1936	28.43	1955	9.51
Saluda R.								
Pelzer	1929-66	405	790	26.48	1949	42.16	1941	15.22
Reedy R.								
Greenville	1941-66	48.6	83.5	23.32	1949	32.96	1955	13.10
GEORGIA								
Middle Oconee R.	1901-32							
Athens	1929-32							
	1937-66	398	500	17.07	1949	29.76	1955	8.50

The water resources of the sub-region are generally adequate for all needs. The following table summarizes the water resource data by major watersheds, as the streams exit the Appalachian Region.

TABLE 7-2
AVERAGE FLOW FROM STREAMS IN SUB-REGION D

Watershed	Million Gallons Per Day (mgd)
New River	700
Dan River	275
Yadkin River	1,939
South Yadkin River	646
Catawba River	1,196
Broad River (NC-SC)	1,842
Pacolet River	420
Tyger River	362
Enoree River	278
Reedy River	194
Saluda River	582
Savannah River	2,714
Broad River (Ga.)	1,015
North Oconee River	265
Middle Oconee River	323

Floods may occur during any month. However, the streams commonly have two high-water periods. The first, or major, period is from December to April; floods being caused by the winter and early spring rainstorms. The second period of high water is from August to October, the floods being caused by the hurricane-type storms that come up the Atlantic Coast. The greatest number of floods occur during the first flood period from December to April; however, the most severe floods predominately occur in the second flood period from August to October. No one flood produced the highest known stages in all portions of the sub-region; however, the August 1940 flood was the most widespread and generally the most severe. Seven different floods have been responsible for establishing the maximum of record at the 10 gaging stations shown on Figure 7-2.

Droughts have occurred in the Sub-region which have extended over rather long periods of time. Using the Yadkin College gage record for the period 1928 to 1960 as a representative sample, the following information was derived:

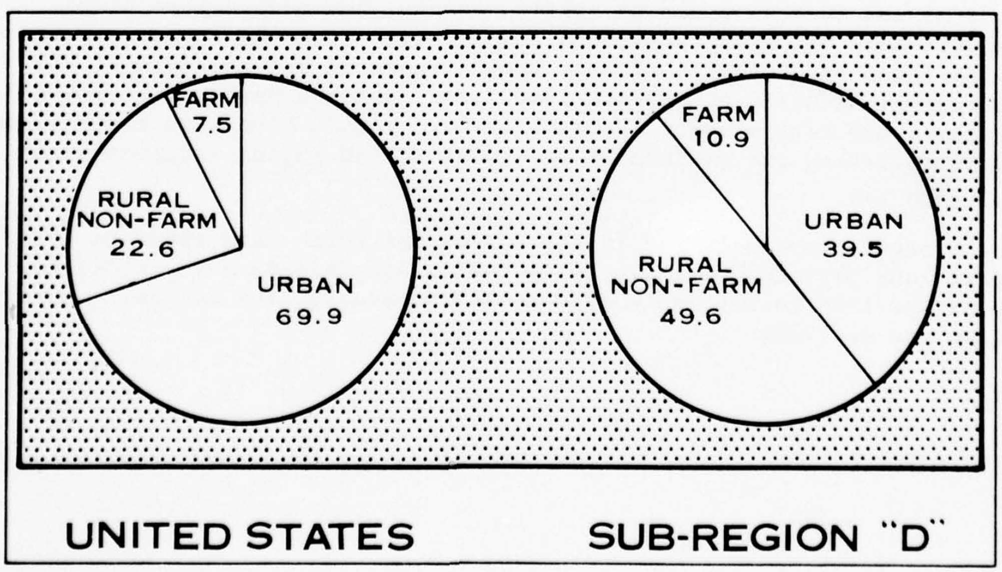
Period	Number of Consecutive Calendar Years	Annual Avg.Runoff for Period in Inches	Percent of Average Runoff for period of Record
1956	1	10.23	59
1941	1	11.17	65
1955-1956	2	10.64	62
1930-1931	2	11.60	67
1954-1956	3	11.19	65
1953-1956	4	12.02	70
1951-1956	6	13.19	76

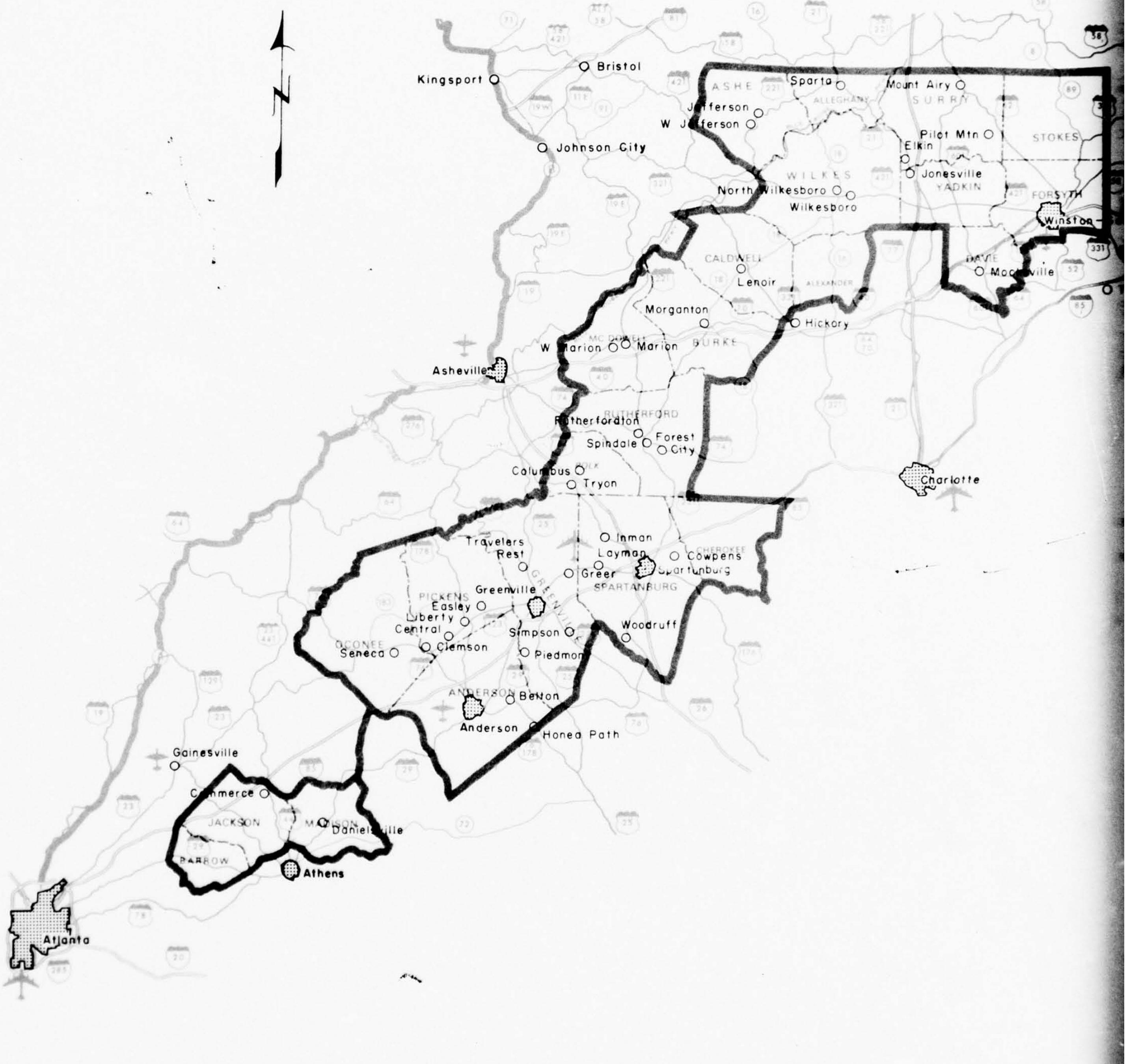
From the foregoing it is concluded that at least three drought periods occurred in a period of 32 years, the worst of which lasted six years.

Transportation. Transportation facilities in the Sub-region are generally adequate. Much of the present urban development is along the major highway corridors such as Interstate Highways 85, 26, and 40 (see Figure 7-3). Railroads (see Figure 7-4) crisscross most of the area with many terminating in cities located at the foot of the Blue Ridge Mountains. Air carrier airports (see Figure 7-3) are available within the region at Winston-Salem, Greenville-Spartanburg and Anderson. Several others are available immediately outside the Sub-region. In addition there are eleven general aviation airports scattered throughout.

3. RESOURCES DEVELOPMENT

Human - The 1960 population of the Sub-region was 1,204,082, with about half of these living in North Carolina. In 1960 Sub-region D had a population that was about 40 percent urban and 60 percent rural, with about 11 percent being farm residents leaving 49 percent rural non-farm (see following figure). Water Area D-2 (the South Carolina and Georgia





Kingsport
Bristol
Johnson City
Sparta
Mount Airy
ASHE
ALLEGHANY
SURRY
Jefferson
W Jefferson
Pilot Mtn
STOKES
Elkin
Jonesville
WILKES
YADKIN
North Wilkesboro
Wilkesboro
FORSYTH
Winston
CALDWELL
Lenoir
DAVIE
Mocksville
ALEXANDER
Morganton
Hickory
MC DOWELL
W Marion
Marion
BURKE
Asheville
RUTHERFORD
Rutherfordton
Spindale
Forest City
POLK
Columbus
Tryon
Charlotte
Travelers Rest
Inman
Layman
Cowpens
CHEROKEE
Greer
Spartanburg
SPARTANBURG
Greenville
GREENVILLE
PICKENS
Easley
Liberty
Central
Clemson
OCONEE
Seneca
Simpson
Piedmont
Woodruff
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Belton
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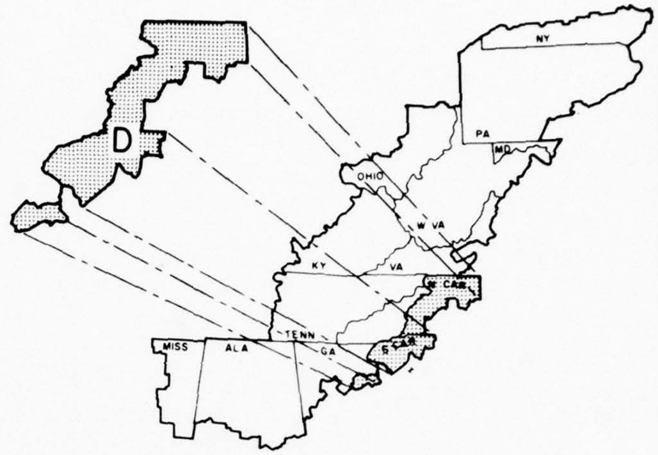

VICINITY MAP

LEGEND

Interstate Highway

Federal Highway

State Highway

Appalachian Corridor

Includes Jet Service

Scheduled Prop Service

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION D

HIGHWAYS & AIRPORTS

OFFICE OF APPALACHIAN STUDIES JUNE 1968

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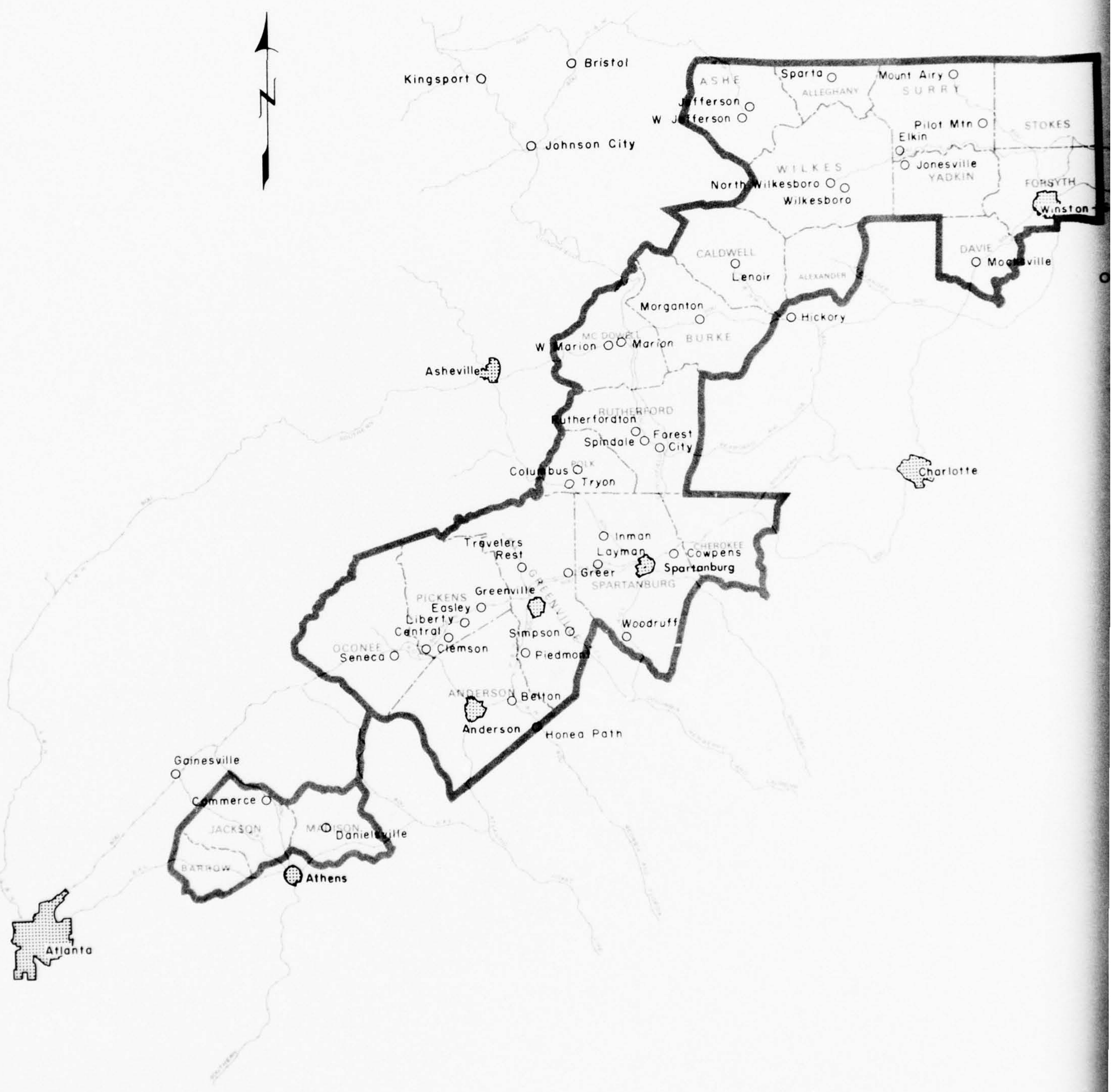
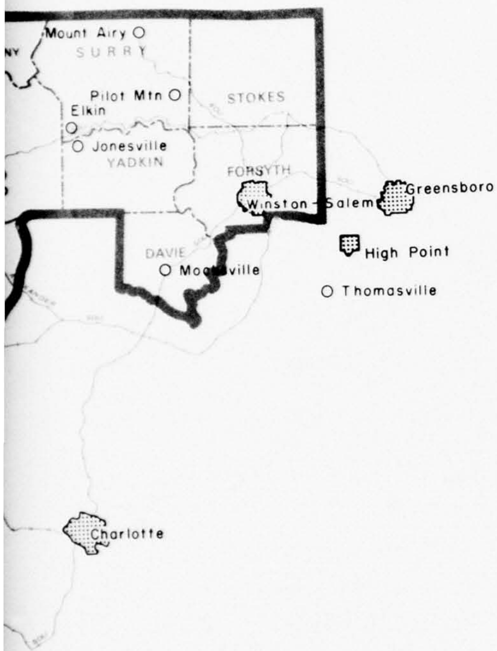
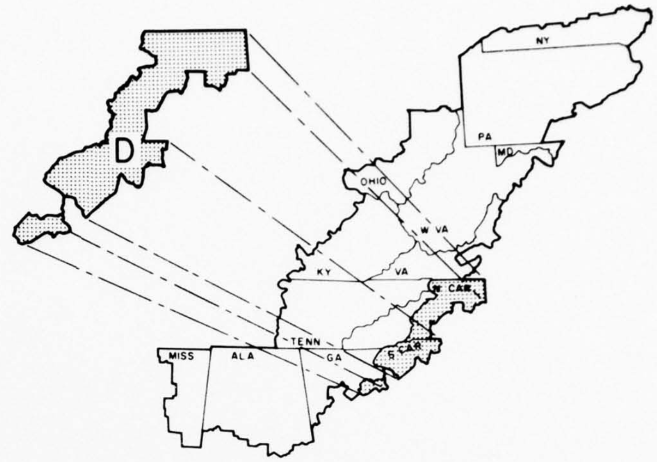
 FIGURE 7-3



Kingsport
Bristol
Johnson City
Asheville
Charlotte
Atlanta
Gainesville
Commerce
Jackson
Madison
Danielsville
Barrow
Athens
Sparta
Mount Airy
Ashe
Alleghany
Surry
Jefferson
W Jefferson
Pilot Mtn
Stokes
Elkin
Jonesville
Wilkes
Yadkin
Forsyth
North Wilkesboro
Wilkesboro
Winston
Davie
Mocksville
Caldwell
Lenoir
Alexander
Morganton
Hickory
W Marion
Marion
Burke
Rutherford
Rutherfordton
Forest City
Spindale
Polk
Columbus
Tryon
Travelers Rest
Inman
Layman
Cherokee
Cowpens
Spartanburg
Greer
Greenville
Pickens
Easley
Liberty
Central
Clemson
Oconee
Seneca
Simpson
Piedmont
Woodruff
Anderson
Belton
Honea Path





VICINITY MAP

10 5 0 10 20 30 40 50

SCALE IN MILES

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION D

RAILROADS

OFFICE OF APPALACHIAN STUDIES JUNE 1968

II 7-13 FIGURE 7-4

counties) with 40 percent urban, was somewhat more urbanized than Water Area D-1 (the North Carolina counties) with 33 percent urban.

In 1960 there were 88 towns of 1,000 or more population in the Sub-region; 36 of these were in the North Carolina part. In South Carolina, Spartanburg County, alone had 20 such communities, while its nearest competitor, Greenville County (adjoining) had nine. For Spartanburg County, these figures reflect the presence of a number of textile mill towns, most of which have a rather static population of between 1,000 and 2,000 persons.

The "urban" population (by definition living in towns of 2,500 or more), was found in 30 communities in the Sub-region, six cities exceeding 10,000 population, two in North Carolina (Lenoir and Winston-Salem), and four in South Carolina (Anderson, Gaffney, Greenville, and Spartanburg). Just outside the Sub-region (see Figure 7-1) are the urban centers of Atlanta, Asheville, Greensboro, Charlotte, and Athens.

Eight of the 23 counties have no community greater than 2,500, and hence their population is completely "rural." The rural population is dominately classified as rural non-farm since only about 11 percent are actively farming. Sixty percent of the urban population (1960) lived in the six cities having a population exceeding 10,000.

It will be seen in Figure 7-5 that the Sub-region has, in most of the younger age groups, a larger percentage of its total population than has the United States. Thus, the Sub-region has relatively more youngsters requiring educational investment. If educational requirements are met, and out-migration is stemmed, an adequate labor force would appear to be achievable for the future.

The Sub-region tends to have relatively more females than the nation as a whole. Males predominate in the younger age groups, but females begin to exceed males in the 15-24 age group, while it is in the older age groups that this happens nationally.

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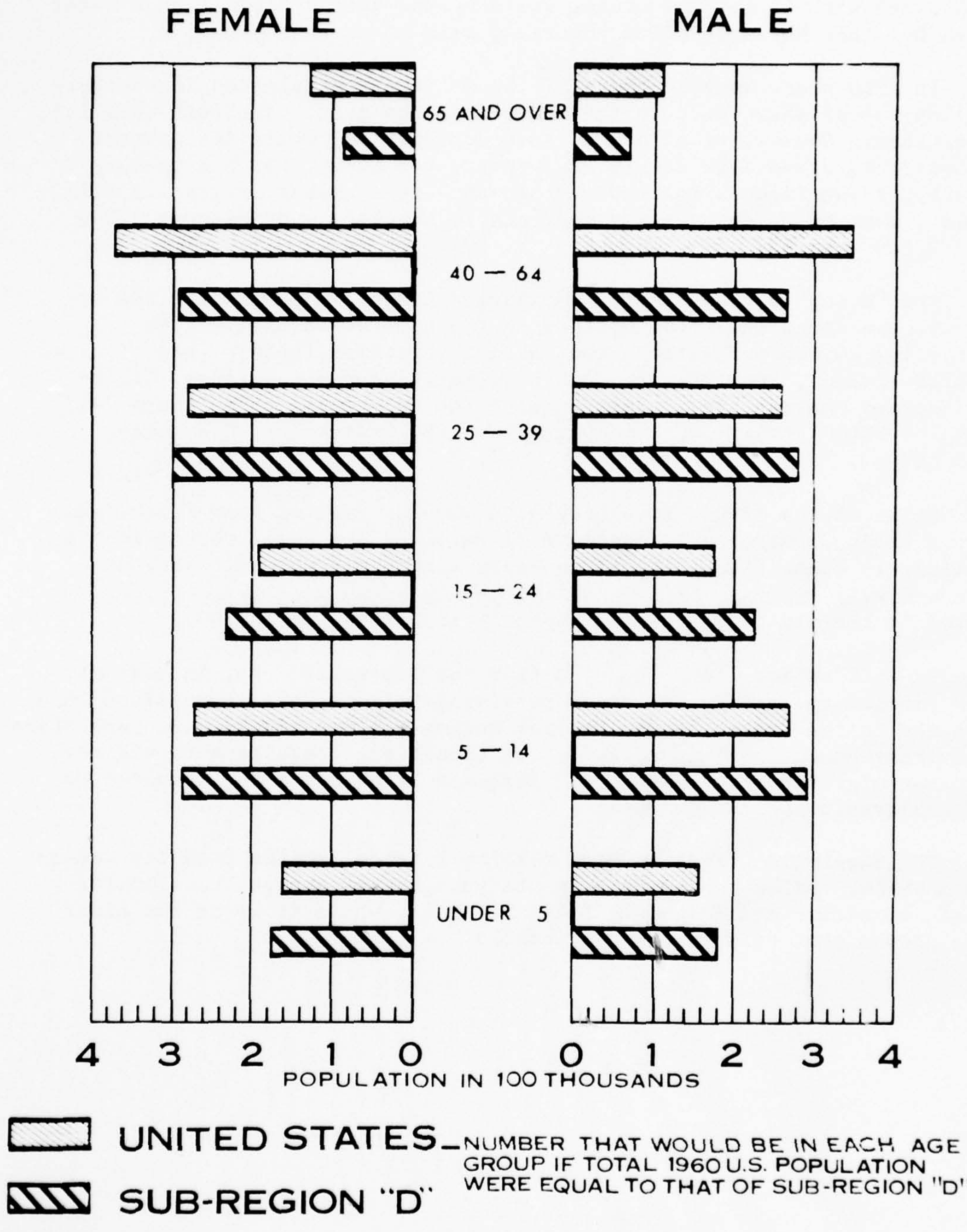
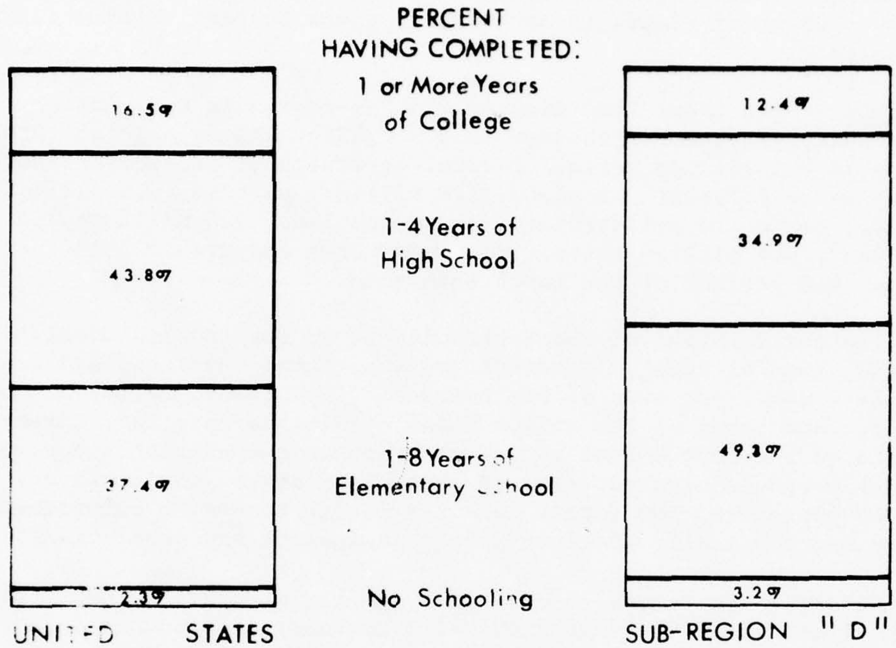


FIGURE 7-5 POPULATION DISTRIBUTION

In the 23-county sub-region, average education attainment is below the national average of median school years completed. As compared to state averages, Forsyth and Polk counties exceed the North Carolina average. Greenville County exceeds the South Carolina average while the three Georgia counties are below the state average. A comparison of educational attainment between sub-region D and the nation is shown below.



The existing labor force skills are generally those required by the major employers, but state training programs are attempting to meet the demands for skilled labor that will be required by new manufacturers.

Most vocational training effort is devoted to supplying, apace with demand, training for young workers, while retraining needs are expected to become more important in the future. For instance, the manpower studies sponsored by the Appalachian Regional Commission in North Carolina have indicated that an overemphasis on college preparation courses at the secondary school level has resulted in the production of students who cannot find jobs within the region. This results in a subsidy to outmigration with a resulting manpower shortage in some areas of North Carolina. A better balance between manpower requirements and training facilities and programs will be required to permit the upgrading of industrial, commercial, educational, health and governmental services in the region.

College enrollment in the sub-region is now about 20,600 and an additional 1[illegible],100 are enrolled in technical or vocational training beyond high school levels. Figure 7-6 gives the locations of such facilities within the sub-region.

Minerals - Minerals development of the Sub-region was one of the motives for early settlement of the region. Iron was mined in western North Carolina and gold was mined in specific localities; but as the deposits were depleted and as labor cost rose the mines closed. The last gold mine closed in 1962. Minerals utilized in the construction industry now comprise the large part of mineral production in the Sub-region. No shortage of these is anticipated to meet any foreseen needs in the future. Bureau of Mines, in Appendix I, gives further information on this subject.

Lands - The total land area of the Sub-region is 6.8 million acres. The present agricultural acreage is 6.5 million and non-agricultural amounts to 0.3 million acres. Present agricultural and forest land acreage is as follows: cropland, 1.6 million; pasture, 0.6 million; national, state and private forests and woodland, 3.9 million; and other land, 0.4 million acres. The water area amounts to 29,500 acres, or about 0.4 percent of the total land area.

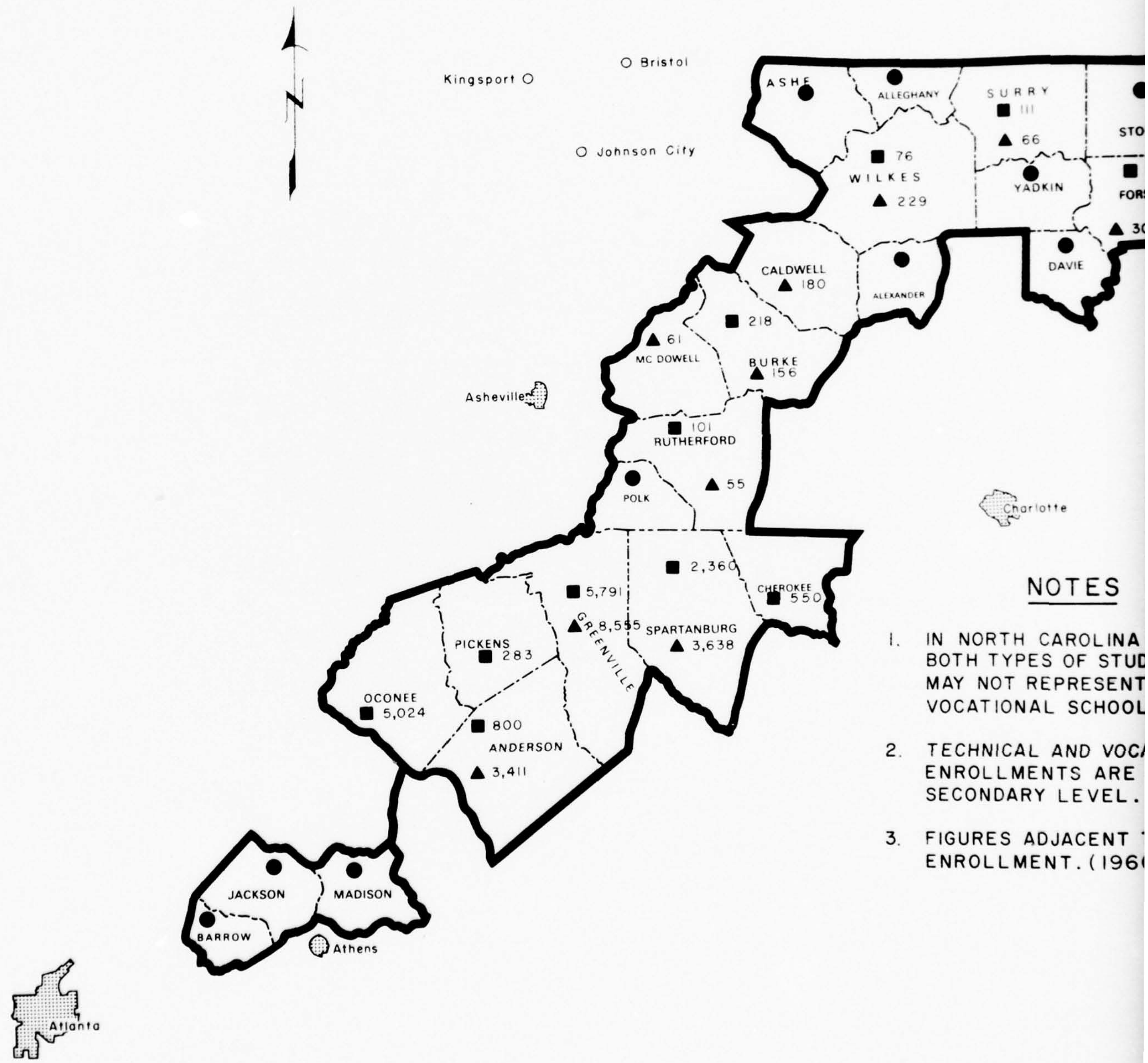
While three-fifths of the Sub-region is in forests and woodland, past use, land clearing, livestock grazing, timber cutting, and forest fires have destroyed much of the humus and the organic matter in the upper surface layer of the soil. These conditions have left three-quarters of the forest land in a poor hydrologic condition and have materially reduced its capacity to absorb and store precipitation. About 60 percent of the forest land has a high to medium potential to improve hydrologically if given proper management and protection.

An increase in forest acreage is projected of about 20,000 acres between 1958 and 1975. This trend will probably continue at about the same rate with most of the acreage increase coming from abandoned crop or pastureland.

The total agricultural land in the Sub-region is expected to decrease by approximately 127,400 acres by 1980, mainly due to increases in land occupied by reservoirs or converted to urban development. The U. S. Soil Conservation Service had completed soil surveys as of July 1967 on about 5.1 million acres of the Sub-region's agricultural land. Of the inventoried acreage, only about 38 percent of the Sub-region, Capability Classes I, II and III is suited for intensive long-term cultivation. The remaining 62 percent is suited only for permanent type vegetation, such as grass, trees, and shrubs for pasture and grazing, forest, and wildlife purposes.

Sub-region D has not been subject to the physical ravages that extensive mining has brought to other Appalachian areas. Hence, the redevelopment of lands has not been necessary.

Environmental Aspects - Sub-region D contains some of the most scenic country in the eastern United States. Scenery is a major asset. The wooded plateaus and mountains, picturesque valleys, pastures, and farmlands characterizes the Sub-region and offer extensive areas of natural beauty.

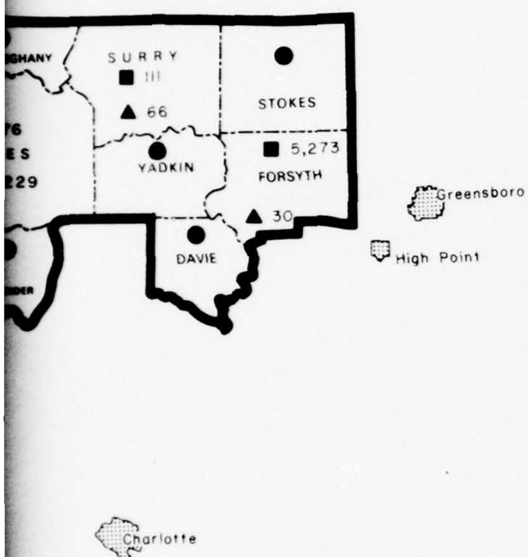


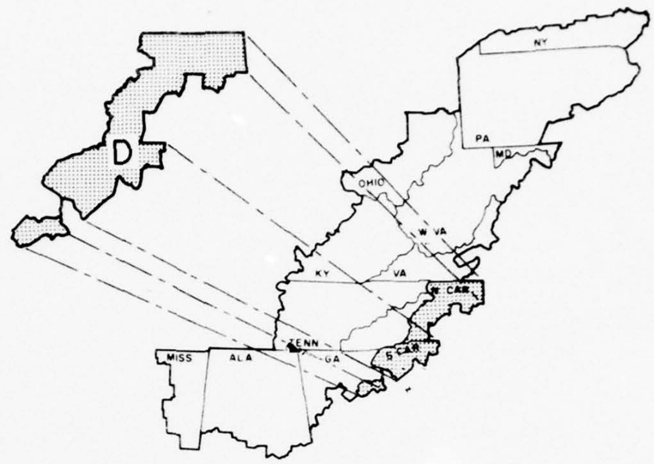
NOTES

1. IN NORTH CAROLINA
BOTH TYPES OF STUD
MAY NOT REPRESENT
VOCATIONAL SCHOOL

2. TECHNICAL AND VOC
ENROLLMENTS ARE
SECONDARY LEVEL.

3. FIGURES ADJACENT
ENROLLMENT. (196





VICINITY MAP

LEGEND

- COUNTIES WITHOUT TECHNICAL / VOCATIONAL SCHOOLS OR COLLEGES
- TECHNICAL OR VOCATIONAL SCHOOLS
- SENIOR AND JUNIOR COLLEGES

NOTES

IN NORTH CAROLINA COMMUNITY COLLEGE HAVE BOTH TYPES OF STUDENTS, HENCE THE TRIANGLE MAY NOT REPRESENT A SEPARATE TECHNICAL VOCATIONAL SCHOOL.

TECHNICAL AND VOCATIONAL SCHOOLS AND ENROLLMENTS ARE SHOWN ONLY BEYOND SECONDARY LEVEL.

FIGURES ADJACENT TO SYMBOLS REPRESENT ENROLLMENT. (1966)

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HIGHER EDUCATION FACILITIES

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Natural beauty is a normal product of effective soil and water conservation practice and sound resource use. Since most of the land in this Sub-region is privately owned, soil and water conservation work done by landowners and operators cooperating with local soil conservation districts plays an important role in enhancing the scenic beauty of the region.

A wide variety of trees and shrubs occur in the Sub-region, including both evergreens and deciduous species. Fruit and nut bearing species are common. The flowering shrubs in the mountains provide a beautiful display in the spring. Rhododendrons, mountain laurels, and flaming azaleas predominate. The vibrant, colorful displays of vegetation in the spring and fall are a definite tourist attraction.

Streams are prevalent in the highlands and the valleys. Natural bodies of water are scarce but numerous man-made lakes and ponds dot the landscape and enhance the attractiveness of the natural environment. It is a region of ancient rugged mountains, deep, narrow coves and valleys, beautiful waterfalls, and wide expanses of rolling Piedmont hills. Superb scenery and an agreeable climate lure the tourist and recreationist. Some of the outstanding scenic natural, and historic areas are: the Blue Ridge Parkway, Linville Gorge, Chimney Rock, Chimney Gap, Pilot Mountain, Cowpens National Battlefield site, Kings Mountain National Military Park, and Mount Jefferson, Hanging Rock, Table Rock, Pleasant Ridge, and Croft State Parks. (See Figure 7-7.)

Publicly owned forest land provides substantial opportunities for outdoor recreation. Hunting, fishing, picnicking, camping, sight-seeing, and driving for pleasure have been popular attractions. National Forest (see Figure 7-7) areas provide 21 small developed camp and picnic sites with a combined capacity of 1,180 persons-at-one-time. In 1966 these received about 355,000 recreation visits and an additional 1,030,000 visits were made to State Forests.

These public forests provide good deer, turkey, squirrel and grouse hunting. Bear hunting continues to provide limited recreation. Habitat manipulation through timber programs is resulting in increased deer population. Cold-water stream fishing is excellent, and trout stocking and fishing use is high.

The rest of the Sub-region is gently rolling to hilly, with considerable woodland interspersed with farming. Deer and squirrel also do well in this area along with farm game, such as bobwhite quail, doves, and cottontail rabbits. Here, fishing is primarily for warm-water species. As of July 1967, a total of 5,186 of the 7,415 farm ponds with a total water surface of 9,640 acres were being stocked and managed for the production of fish.

The U. S. Department of Agriculture's upstream watershed projects (see Figure 7-8) authorized for operations as of July 1967 include additional storage and development for recreation. These developments provide 447 acres of water surface with adjacent land area which will accommodate 146,600 recreation-days annually.

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Corps of Engineers reservoir projects in operation within the Sub-region provide a surface area of 62,820 acres for water oriented recreational activities with public access. Construction of Reddies River Reservoir will add 720 acres of water with public access. Location of these projects and others located near the sub-region are also shown in Figure 7-8.

Public Power Company projects provide an estimated surface area of 15,400 acres and certain public use facilities. As indicated in figure 7-8 additional water surface is available on non-federal reservoirs and lakes nearby. The Keowee-Toxaway project will add 25,940 acres of recreation water with public access.

Water Resources Development - Federal.

Corps of Engineers.

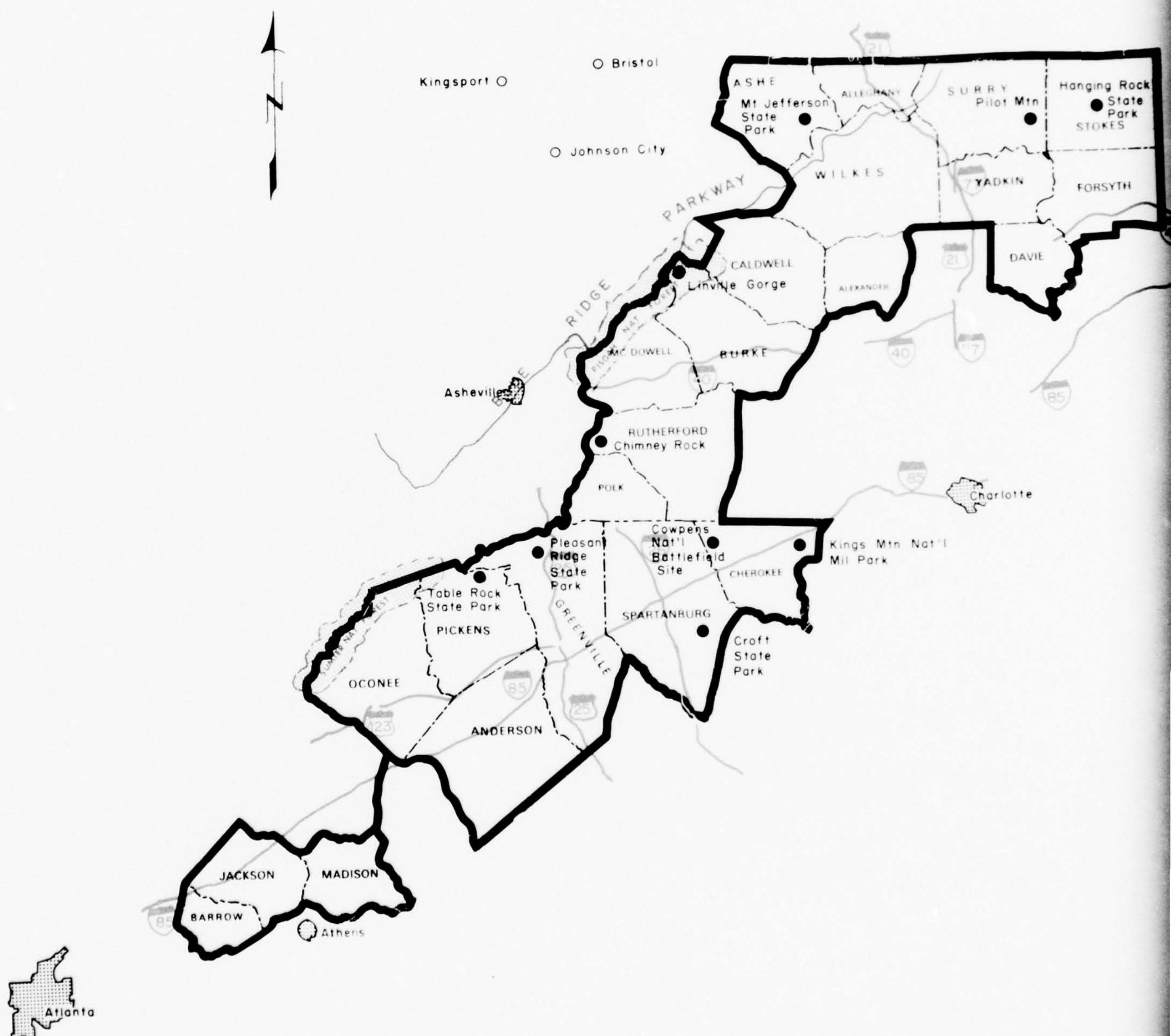
The W. Kerr Scott Reservoir constructed by the Charleston District is located in Wilkes County, North Carolina. The damsite is 388 river miles above the mouth of Yadkin River; the reservoir when full extends about 15 miles upstream from the dam. The project was completed in 1962 and provides storage for both flood control and water supply: facilities have been provided for recreation at the project.

Hartwell Reservoir constructed by the Savannah District is located on the South Carolina-Georgia border and lies within Anderson and Oconee Counties, South Carolina which are within water Sub-region D. The dam itself is 3[illegible]5 river miles above the mouth of the Savannah River; the reservoir extends some 30 miles further upstream. The project was completed in 1961 and provides storage for flood control, low flow augmentation and power generation. Considerable development has been made for recreation within the project limits.

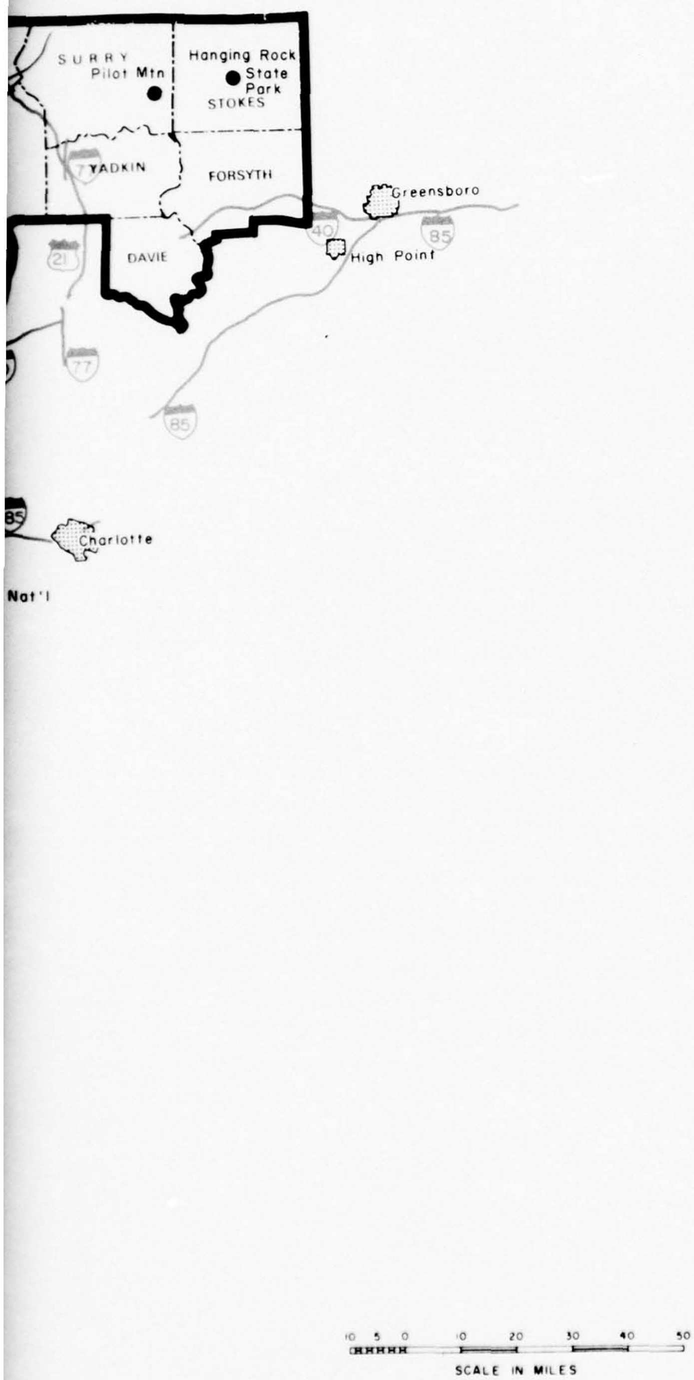
The authorized Reddies River Reservoir is likely to be the next multiple-purpose reservoir constructed by the Corps of Engineers in this sub-region. Advance planning for this project has been initiated. The project is located entirely within Wilkes County, North Carolina. As proposed the dam would be about 1.6 miles above the mouth of Reddies River and the reservoir would extend upstream from that point some 10 miles. The project will likely include storage for flood control. for low flow augmentation and water quality control. Recreation facilities compatible with the area's needs would be provided.

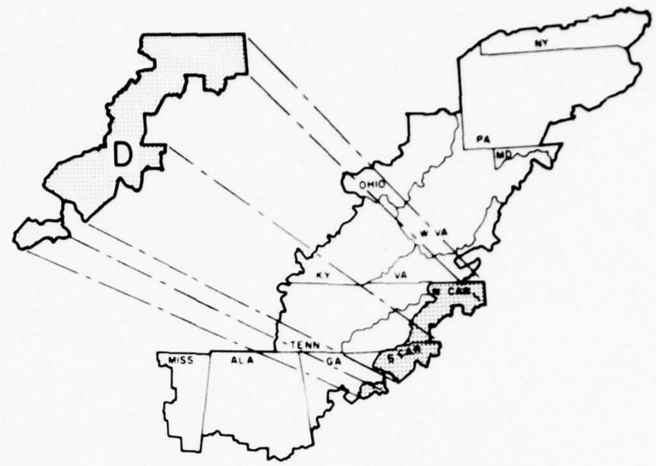
The Trotters Shoals project (to be completed in 1977) is located on the Savannah River, 276.2 miles above the mouth, and about 38.5 miles above Clark Hill Reservoir. The damsite is located in Elbert County, Ga., and Abbeville County, S.C. The reservoir will extend into Hart County, Ga., and Anderson County, S.C. The project will include storage for power, recreation and fish and wildlife.

Pertinent data for the above projects are given in Table 7-3 and their locations are shown on Figure 7-8.



Kingsport
Bristol
Johnson City
ASHE
Mt Jefferson State Park
ALLEGHANY
SURRY
Pilot Mtn
Hanging Rock State Park
STOKES
WILKES
YADKIN
FORSYTH
DAVIE
BLUE RIDGE PARKWAY
CALDWELL
Linville Gorge
ALEXANDER
MC DOWELL
BURKE
Asheville
RUTHERFORD
Chimney Rock
POLK
Charlotte
Cowpens Nat'l Battlefield Site
Kings Mtn Nat'l Mil Park
CHEROKEE
Pleasant Ridge State Park
Table Rock State Park
PICKENS
GREENVILLE
SPARTANBURG
Croft State Park
OCONEE
ANDERSON
JACKSON
MADISON
BARROW
Athens
Atlanta





VICINITY MAP

REPORT FOR
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IN
APPALACHIA

WATER SUB-REGION D

SCENIC AND HISTORICAL SITES

OFFICE OF APPALACHIAN STUDIES JUNE 1968

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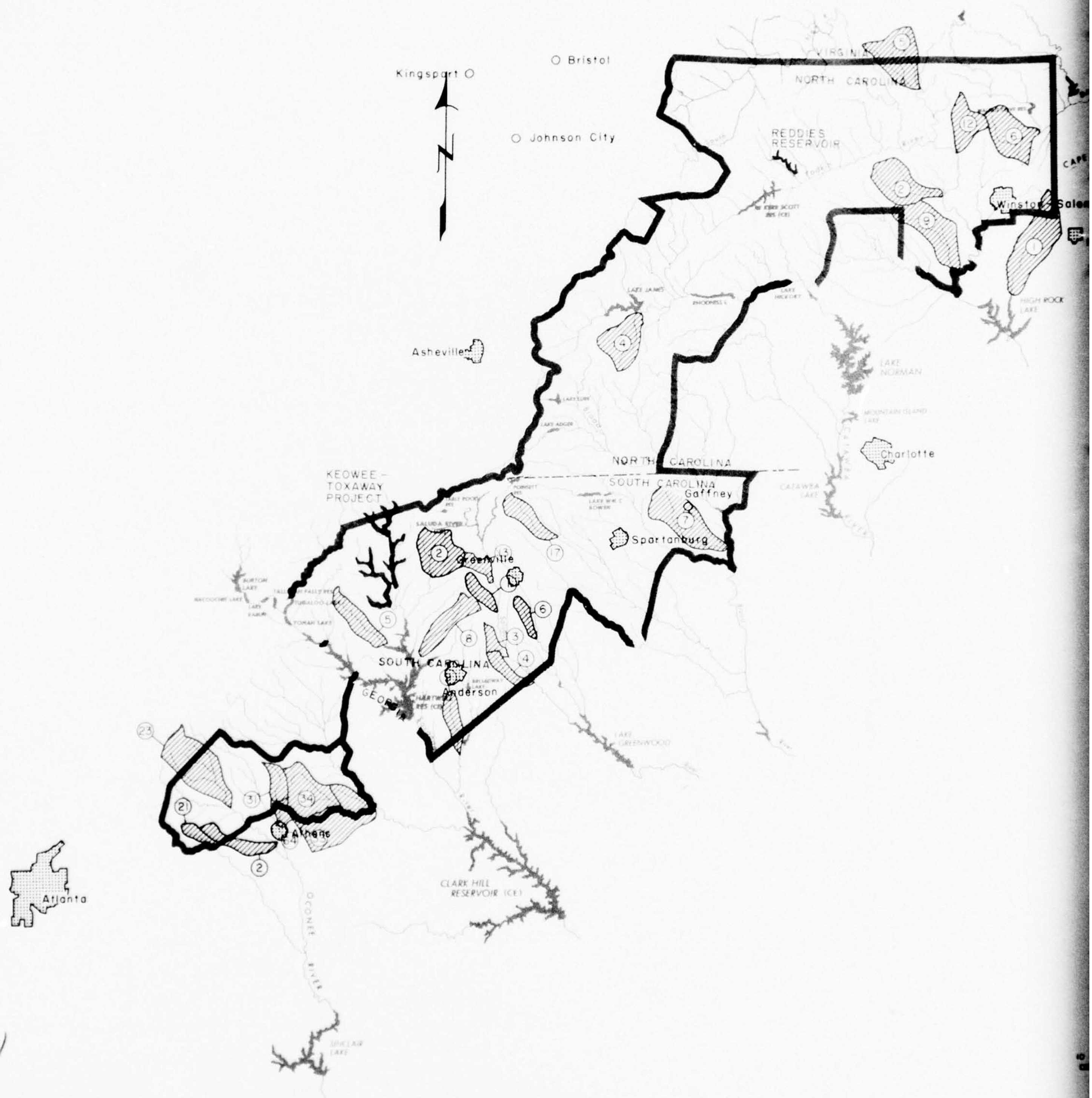
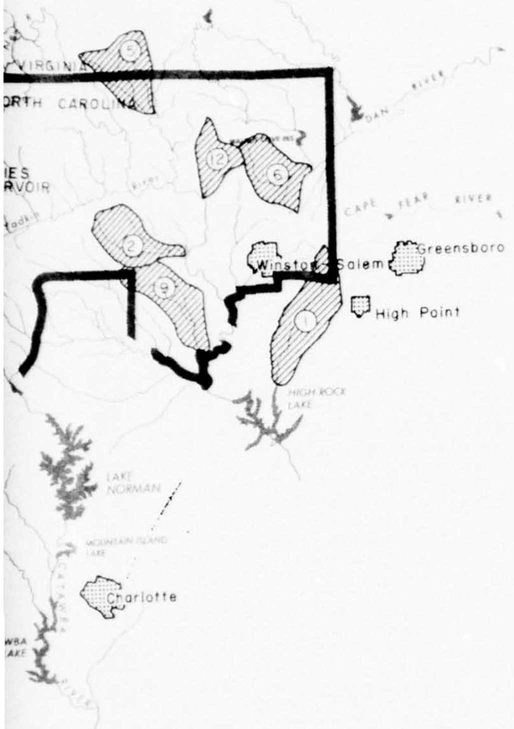
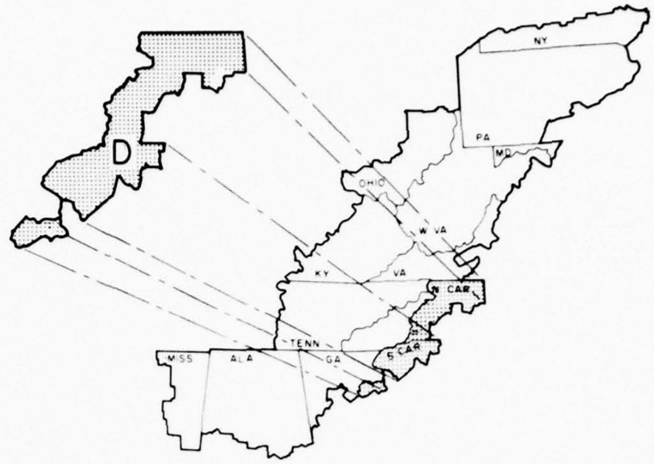


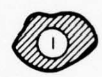
Kingsport
Bristol
Johnson City
VIRGINIA
NORTH CAROLINA
REDDIES RESERVOIR
HIGH ROCK LAKE
LAKE JAMES
Asheville
LAKE NORMAN
MOUNTAIN ISLAND LAKE
Charlotte
NORTH CAROLINA
SOUTH CAROLINA
Gaffney
Spartanburg
CATAWBA LAKE
KEOWEE-TOXAWAY PROJECT
Greenville
SOUTH CAROLINA
Anderson
GEORGIA
LAKE GREENWOOD
Athens
Atlanta
CLARK HILL RESERVOIR (CE)
OCONEE RIVER
SINCLAIR LAKE





VICINITY MAP

UPSTREAM WATERSHEDS


COMPLETED


EXPECTED TO BE
COMPLETED BY 1980

MAJOR RESERVOIRS


COMPLETED


EXPECTED TO BE
COMPLETED BY 1980

10 5 0 10 20 30 40 50
SCALE IN MILES

REPORT FOR
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IN
APPALACHIA

WATER SUB-REGION D

WATER RESOURCES DEVELOPMENT

OFFICE OF APPALACHIAN STUDIES JUNE 1968

II-7-25 FIGURE 7-8

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TABLE 7-3
SUMMARY OF PERTINENT DATA
MAJOR RESERVOIRS, WATER SUB-REGION

ITEM	Corps of Engineers: W.Kerr Scott Reser.	Corps of Engineers: Reddies R. Reser.	Corps of Engineers: Hartwell Reser.	Duke Power Co.: Lake James Bridgewater Dam	Duke Power Co.: Lk. Rhodhiss Rhodhiss Dam	Duke Power Co.: Lk.Hickory Oxford Dam	Duke Power Co.: Lookout Pond (Lookout Shoals Dam)
LOCATION							
Stream	Yadkin R.	Reddies R.	Savannah R.	Catawba R.	Catawba R.	Catawba R.	Catawba R.
River Mile	388	1.6	305	273	242	225	216
County	Wilkes	Wilkes	Anderson	Burke	Burke	Alexander	Iredell - Catawba
State	N.Ca.	N.Ca.	Ga.&S.Ca.	N.Ca.	N.Ca.	N.Ca.	N.Ca.
Status	Operating	AE&D	Operating	Operating	Operating	Operating	Operating
Auth.Purposes	FC, WS	FC	FC, LF, P				
Completion Date	Aug. 1962	---	Feb. 1961	1919	1925	1928	1915
Drainage Area Above (Sq.Mi.)	348	94.5	2,088	380	1,088	1,310	1,449
Elevation (ft. msl)							
Top of Upper Pool (FC/Power)	1,075	1,110	665	1,200	995	935	838
Top of Conservation Pool	1,030	1,076	625	---	---	---	---
Storage Allocated to (acre feet)							
Flood Control	112,000	35,000	295,500	---	---	---	---
Power	---	---	1,427,600	300,000	39,000	127,500	40,000
Water Quality	---	12,000	---	---	---	---	---
Water Supply	33,000	9,150	---	---	---	---	---
Sediment Silt Reserve	8,000	4,350	---	---	---	---	---
TOTAL	153,000	60,500	2,842,700	300,000	39,000	127,500	40,000
Surface Area (acres)							
Top of Upper Pool (FC/Power)	4,000	1,383	61,350	6,510	3,515	4,110	1,270
Top of Conservation Pool	1,470	720	56,000	---	---	---	---
Power Installation (Hydro)							
Capacity (1000 KW)	---	---	330	25	25.5	45	23
No. of Units	---	---	5	---	---	---	---
Yield (MGD)							
Water Supply	165	32	---	---	3.6[B]	4.6[B]	---
Water Quality	---	26	---	---	A	A	---
Low Flow Augmentation	---	---	NOTE E	---	---	---	---

A Duke Power permits withdrawal of water for municipal and industrial use to six municipalities, with a 1960 population of
a 1960 population of 8,600 from the Holiday's Bridge Reservoir (a run of the river plant).

B Apparent demand (use) 1965 (1960 population X 1.4 1965 population X 147gpcd ÷ 10^6 MGD).

C Water stored at Wm.C.Bowen and S. Pacolet Reservoirs #1 available for water supply or power generation.

D Two reservoirs should supply a constant demand of 40 MGD, present treatment plant capacity 27 MGD, planning to expand to

E Power releases serve as low flow augmentation for navigation below Augusta.

TABLE 7-3
SUMMARY OF PERTINENT DATA
R RESERVOIRS, WATER SUB-REGION D

	Duke Power Co.				City of Greenville		City of Spartanburg	
		Lookout Pond	Keowee-Toxaway Proj.					
iss Dam	Lk.Hickory Oxford Dam	(Lookout Shoals Dam)	Jocassee Dam	Lake Keowee	No.Saluda (Poinsett)	Table Rock	Spartanburg (S.Pacolet Res. #1)	Lk.Wm.C. Bowen
R.	Catawba R.	Catawba R.	Keowee R.	Little R.	N.Saluda R.	S.Saluda R.	S.Pacolet	S.Pacolet
	225	216					0.4	2.0
	Alexander	Iredell - Catawba	Oconee - Pickens	Oconee - Pickens	Greenville	Greenville	Spartanburg	Spartanburg
	N.Ca.	N.Ca.	S.Ca.	N.&S.Ca.	S.Ca.	S.Ca.	S.Ca.	S.Ca.
:	Operating	Operating	Under Const.	Under Const.	Operating	Operating	Operating	Operating
	1928	1915	1974	1971	1959	1929	1926	1960
	1,310	1,449			26	14.5	92	90
	935	838	1,110	800	1,230	1,250	778	815
	---	---	---	---	---	---	---	---
	---	---	---	---	---	---	---	---
	127,500	40,000	956,000	1,160,000	---	---	---[C]	---
	---	---	---	---	---	---	---	---
	---	---	---	---	76,100	16,940	3,386[C]	24,080
	---	---	---	---	---	12,280	1,074	---
	127,500	40,000	956,000	1,160,000	76,100	29,220	4,460	24,080
	4,110	1,270	18,370	7,570	1,080	500	200 EST	1,600
	---	---	---	---	---	---	---	---
	45	23	140	610	---	---	1	---
	---	---	---	---	---	---	2	---
	4.6[B]	---	---	---	41.0 -- dependable	19.5 -- dependable	....NOTE D.........	
	A	---	---	---	---	---	---	---
	---	---	---	---	---	---	---	---

es, with a 1960 population of 39,600 from Lake Rhodhiss and Hickory, and to two communities in South Carolina with

generation.

27 MGD, planning to expand to 32 MGD.

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U.S. Department of Agriculture.

As of July 1967, five upstream watershed projects had been completely installed. These projects are as follows (see Figure 7-8):

Location Number	Name of Watershed	State
2	Barber Creek	Georgia
21	Marbury Creek	Georgia
1	Brushy Creek	South Carolina
6	Huff Creek	South Carolina
2	Twelve Mile Creek	South Carolina

These watersheds comprise an area of 243.7 square miles. A total of 23 retarding and multi-purpose reservoirs controlling 93.2 square miles and 53.6 miles of channel improvement has been installed. The reservoirs contain 1,900 acre feet of storage for sediment, 23,200 acre feet for flood prevention, 1,200 acre feet for municipal and industrial water supply and 1,900 acre feet for fish and wildlife.

The estimated installation costs for the structural measures in the five watersheds total about $2.5 million, with $1.9 million for land treatment measures. Average annual flood water damages before projects were installed totaled an estimated $90,000. The average annual benefits from the installation of the projects are an estimated $154,500.

As of July 1967, an additional 20 upstream watershed projects had been approved and are being installed. These projects are as follows:

Location Number	Name of Watershed	State
64	Litte Sandy and Trail Creek	Georgia
23	Middle Oconee-Walnut Creek	Georgia
31	Sandy Creek	Georgia
34	South River	Georgia
2	Deep Creek	North Carolina
9	Dutchman Creek	North Carolina
12	Little Yadkin River	North Carolina
4	Muddy Creek	North Carolina
5	Stewarts-Lovills Creek	North Carolina
6	Town Fork Creek	North Carolina
3	Big Creek	South Carolina
4	Broad Mouth Creek	South Carolina
5	Coneross Creek	South Carolina
13	Georges Creek	South Carolina
17	South Tyger River	South Carolina
7	Thicketty Creek	South Carolina
8	Three and Twenty Creek	South Carolina
9	Wilson Creek	South Carolina

These watersheds comprise an area of 1,725.3 square miles. A total

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of 159 retarding and multi-purpose reservoirs controlling 779.8 square miles and 426.7 miles of channel improvement is being installed. The reservoirs contain 28,810 acre feet of storage for sediment, 161,923 acre feet for flood prevention, 3,359 acre feet for municipal and industrial water supply and 780 acre feet for fish and wildlife.

The estimated installation costs for the structural measures in the twenty watersheds total about $18.0 million, with $12.3 million for land treatment measures. Average annual flood water damages before projects were installed totaled an estimated $1.001,600. The average annual benefits from the installation of the projects are an estimated $1,617,200.

The land treatment programs of the U. S. Department of Agriculture are contributing to improve water quality in the Sub-region, mainly through the reduction of erosion. Conservation plans are being put into effect for about 1,927,900 acres, and as of July 1967, a total of 2,298,700 acres or 34 percent of land in the Sub-region had been adequately treated through the inauguration of conservation practices.

Assistance to local organizations and individuals in planning and installing forestry measures for watershed protection and flood prevention on non-federal lands is provided by State Foresters in cooperation with the Forest Service. These cooperative programs also provide forest fire protection, insect and disease control, technical assistance to improve the management of forests and the operations of small forest products processors, and to produce and distribute forest planting stock.

The Forest Service also administers 235,300 acres of the Sumter and Pisgah National Forests in the Sub-region. (See Figure 7-7.) These lands are managed under the multiple use concept for the production of high quality water, recreation, timber, fish and wildlife. The results of research in water yield improvement at Coweeta Hydrologic Laboratory at Franklin, North Carolina, just outside the Sub-region are applicable here.

Water Resources Development - Non-Federal

Duke Power Company

A relatively high degree of water resource development has been undertaken in Sub-region D by Duke Power Company. Duke owns 11 reservoirs on the Catawba River and has 17 leased reservoirs elsewhere. Four of the Catawba River Reservoirs are located in Sub-region D. The firm has two reservoirs under construction in Sub-region D which are part of the Keowee-Toxaway power project. Physical data concerning these six projects are included in Table 7-3 and location of the reservoirs is shown in Figure 7-8.

Duke Power Company has followed a policy permitting the use of its reservoirs as a source of public water supply. Eight municipalities in Sub-region D presently withdraw water under this arrangement. Another municipality, Easley, South Carolina, has a water intake under construction.

Municipal

Table 7-4 presents an inventory of water supply sources for cities exceeding 5000 population in the sub-region. It may be noted that Duke Power owns water distribution systems in Anderson and Clemson, South Carolina and at Rutherfordton, North Carolina.

TABLE 7-4
MUNICIPAL WATER FACILITIES - CITIES EXCEEDING 5,000 POPULATION

City	Est. Pop. Served	Source of Supply	Rated Plant Cap. MGD	Average Plant Output MGD
Mt. Airy	8,500	Stewarts Cr. Lovills Cr.	2.5	1.8
Winston-Salem	138,600	Salem Cr. - Yadkin R.	32.0	17.9
Lenoir	12,000	Zacks Fork Cr.	4.5	2.0
Morganton	13,000	Catawba R. Upper Cr. - Catawba R.	4.0	2.8
Forest City	7,500	Henry R. 2nd Broad R.	2.0	.7
North Wilkesboro	5,000	Yadkin R.	3.0	1.2
Marion	9,000	Catawba R.	4.5	2.7
		SOUTH CAROLINA		
Gaffney	19,400	Cherokee Cr. - Broad R.	3.0	2.6
Spartanburg	73,200	South Pacolet R.	19.0	12.5
Greer	18,000	South Tyger R.	4.5	2.0
Greenville	180,000	S. Saluda R. - N. Saluda R.	40.0	20.0
Easley	7,200	Twelve Mile Cr.	1.0	----
Anderson	44,500	Rocky R. - Bailey Cr.	10.0	4.5
TOTAL	521,900		130.0	70.7

The cities of Greenville and Spartanburg, South Carolina each own two relatively large reservoirs. Greenville's are both located in Greenville County on the North and South Saluda Rivers respectively and have a combined yield of approximately 60 million gallons a day. Spartanburg's two reservoirs are both located in Spartanburg County on the South Pacolet River and have a dependable yield estimated at 40 million gallons a day. Pertinent physical data of these four reservoirs is included in Table 7-3 and their locations are shown in Figure 7-8.

SECTION II - SOCIO-ECONOMIC STRUCTURE

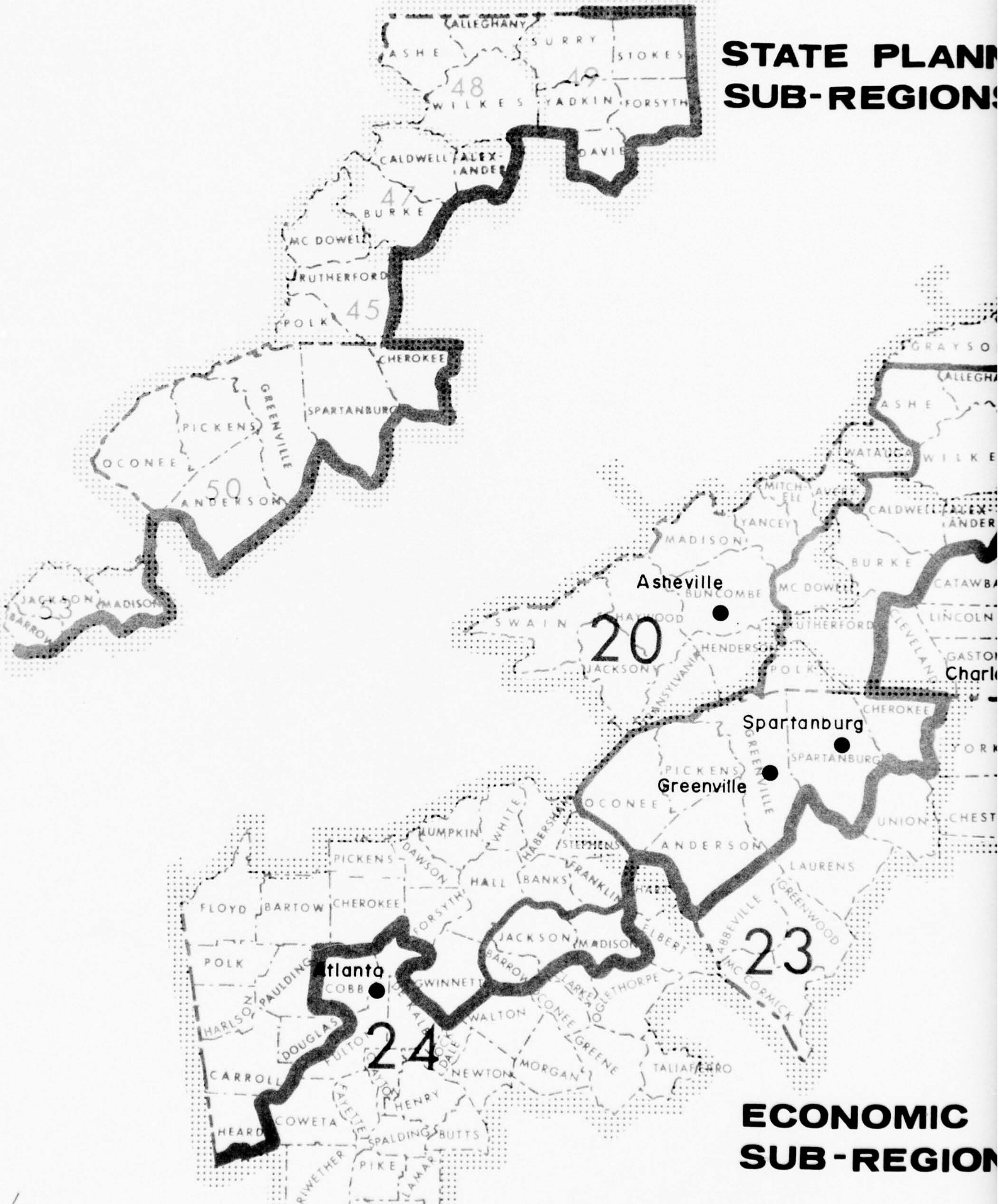
4. INTRODUCTION

Planning Devices - A number of Sub-regional geographic divisions have been utilized in studying the socio-economic aspects of Appalachia. In general, the Appalachian Regional Commission has been concerned with immediate and near future problems, whereas water resources analysis require projections of 50 to 100 years in the future. As a result, the most current data available is that prepared by the ARC, and the long-range projections are those prepared by the Office of Business Economics for the Corps of Engineers and the benchmarks prepared therefrom by the Office of Appalachian Studies. The projections are by Water Sub-region and areas, while the ARC data is by State Planning Sub-regions.

In this chapter, ARC data are utilized; therefore, the information is presented by State Planning Sub-regions and their associated growth centers. The long-range projections by Water Sub-regions and Water Areas follow in the next chapter.

There are six State Planning Sub-regions in Water Sub-region D. The boundaries and identification number of each sub-region are presented in Figure 7-9.

State Planning Sub-region Number	Name	State	Growth Centers
45	Isothermal EDD	North Carolina	Marion-W.Marion; Rutherfordton-Forsyth City-Spindale
47	ABC EDD	North Carolina	Lenoir;Morganton
48	Blue Ridge EDD	North Carolina	Wilkesboro-N.Wilkesboro
49	Northeast NC EDD	North Carolina	Winston-Salem; Elkins-Jonesboro; Mt. Airy
50		South Carolina	Greenville-Spartanburg; Anderson;Gaffney; Liberty-Seneca
53		Georgia	Winder



STATE PLANN
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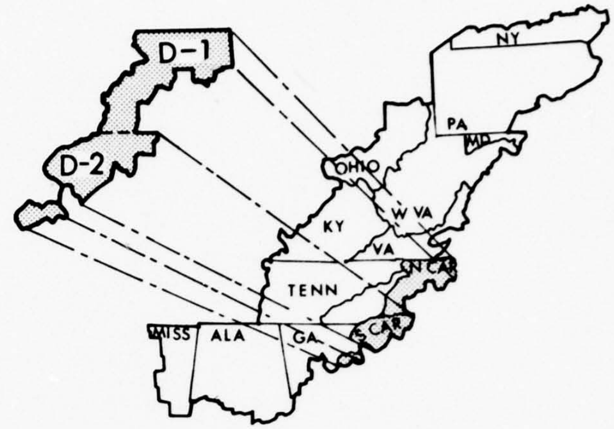
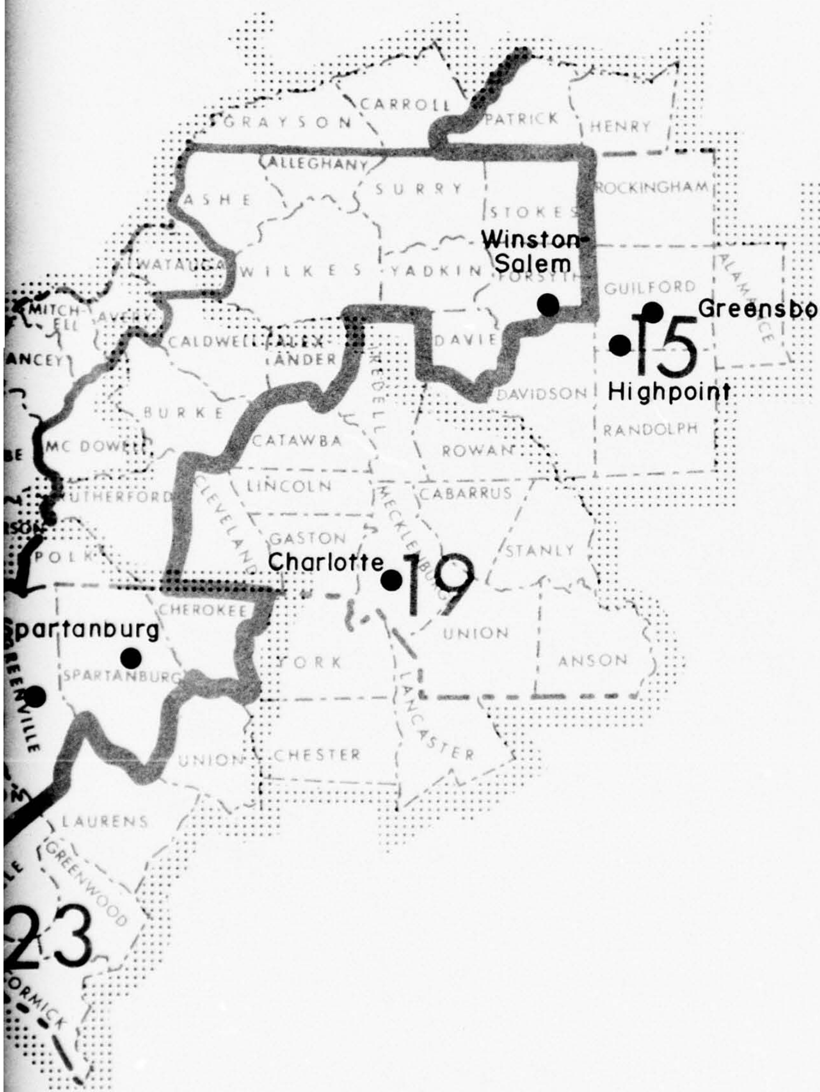


VICINITY MAP



APPALACHIAN REGION BOUNDARY

ECONOMIC
SUB-REGIONS

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB - REGION D

PLANNING AREAS

OFFICE OF APPALACHIAN STUDIES JUNE 1968

II-7-33 FIGURE 7-9

An additional delineation for planning purposes has been made by the Office of Business Economics. The delineation is based on various measures of economic interdependence and the tendency towards homogenous clusters of counties (see Figure 7-9). Alleghany, Ashe, Davie, Forsyth, Stokes, Surry, Wilkes, and Yadkin Counties, North Carolina comprise Economic Sub-region 15, along with five non-Appalachian North Carolina Counties and four Virginia Counties, two of which are in Appalachia. This Sub-region is centered on the Winston-Salem/Greensboro/High Point Metropolitan Area.

Economic Area 19, focused on Charlotte, is composed of four Water Sub-region D counties - Alexander, Burke, Caldwell, and Rutherford - and one Appalachian county in Water Area J-2. Eleven North Carolina counties, as well as three South Carolina, which are non-Appalachian, complete the region.

McDowell, North Carolina and ten Appalachian counties in Water Area J-2, constitute Economic Sub-region 20, which is economically oriented towards Asheville, North Carolina.

The Greenville-Spartanburg area is the focus for Economic Sub-region 23, which consists of Polk County in North Carolina, the six South Carolina Appalachian counties - Anderson, Cherokee, Greenville, Oconee, Pickens, and Spartanburg - and five non-Appalachian South Carolina counties.

Barrow, Jackson, and Madison Counties, Georgia comprise a portion of Economic Sub-region 24, centered on Atlanta. Nineteen Appalachian counties twelve in Water Area E-1 and seven in E-2 -- and twenty-three non-Appalachian Georgia counties comprise the remainder of the economic area.

Comprehensive area planning agencies are responsible for development plans throughout much of the Sub-region, including the four largest county areas -- Greenville, Spartanburg, Winston-Salem, and Anderson. The three Georgia counties are components of the Northeast Georgia Area Planning and Development Commission. Several of the smaller counties are now establishing planning authorities.

State agencies in the three states assist in industrial solicitation and location. Numerous private and public groups in the various communities are also participating.

The following paragraphs discuss the socio-economic characteristics of the water sub-region then go to a more intimate analysis of each State Planning Sub-region.

Economic Characteristics - About 44 percent of those employed in the Sub-region (1960) are engaged in manufacturing (see the following diagram); only about 7 percent are engaged in agriculture. In this respect, it should be noted that the states of North Carolina and South Carolina as a whole have about 12 percent engaged in agriculture. The dominant manufacturing activities are textiles, lumber, furniture, tobacco, and

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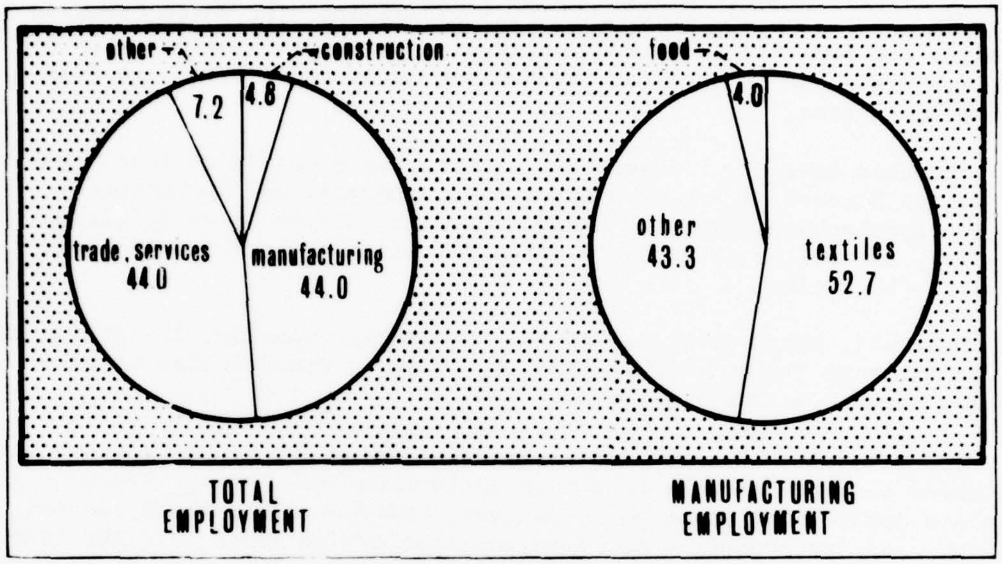
apparel. It is generally recognized that if a skilled labor force is to be retained in the Sub-region, much of this "old line" employment will have to be replaced with "new line" industries such as machinery, chemicals, and metals, which are generally characterized by high-wage scales.

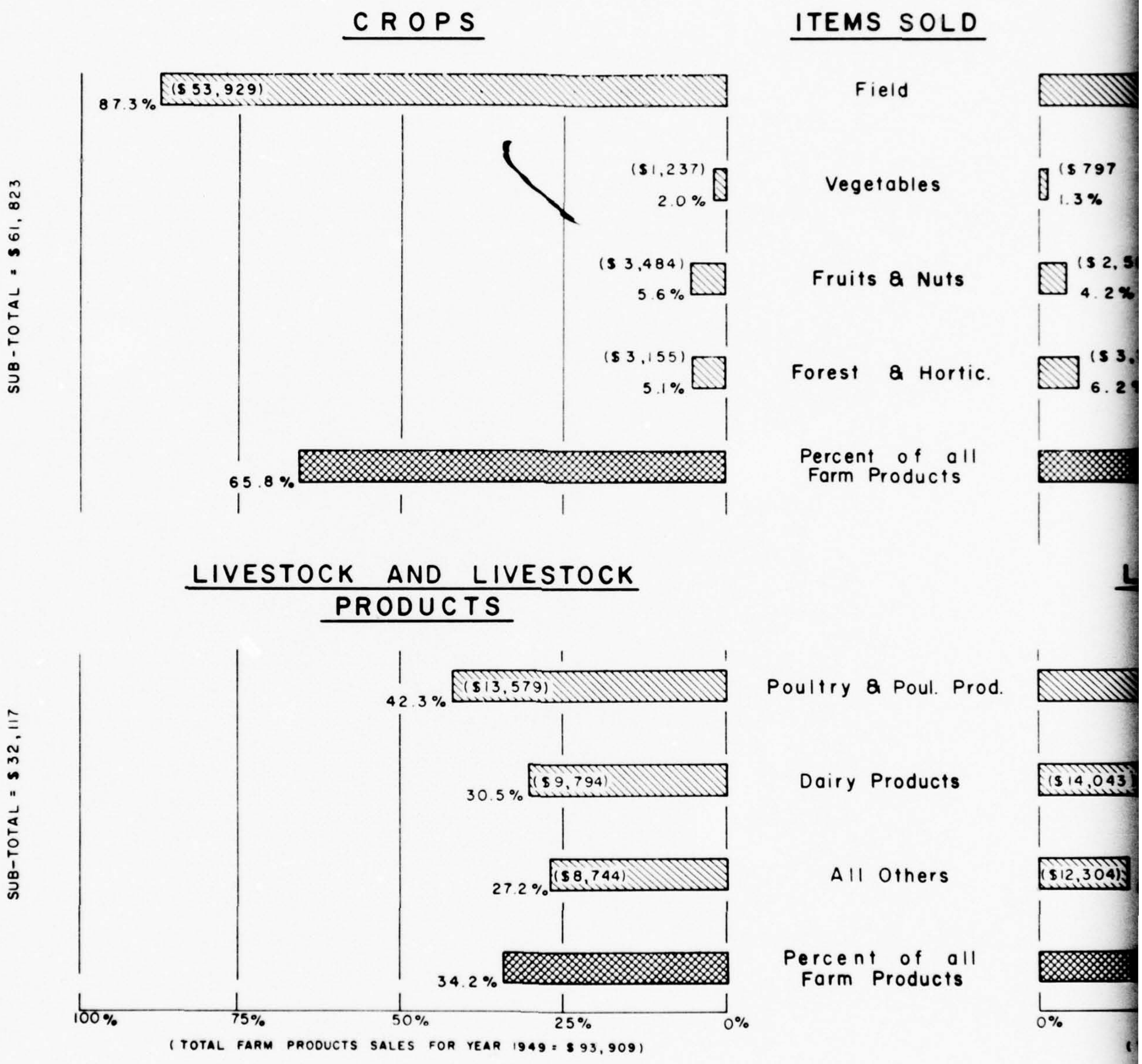


Agriculture (1962) accounted for less than 1 percent of the wage-salary income of employed persons in the Sub-region, although 7 percent were employed in agriculture. If farm proprietors' income is added to this, the total earnings from farming amounts to about 6 percent of the total wage and salary income of the Sub-region. Of course, the importance of agriculture increases substantially when the forward linkages to the textile, apparel, tobacco and food industries and backward linkages to supplies of goods and services to the agricultural industry are included.

The 1964 agricultural census figures for Sub-region D (Figure 7-10) show that livestock and livestock products were the leading agricultural products, in terms of value. The value of such products amounted to about $89 million, while the value of all crops amounted to $61 million. The bulk of such livestock products consisted of poultry and poultry products. The value of livestock was more than double that of crops in Water Area D-2, while it was only slightly greater than that of crops in Water Area D-1, largely due to the popularity of raising high-value tobacco in North Carolina.

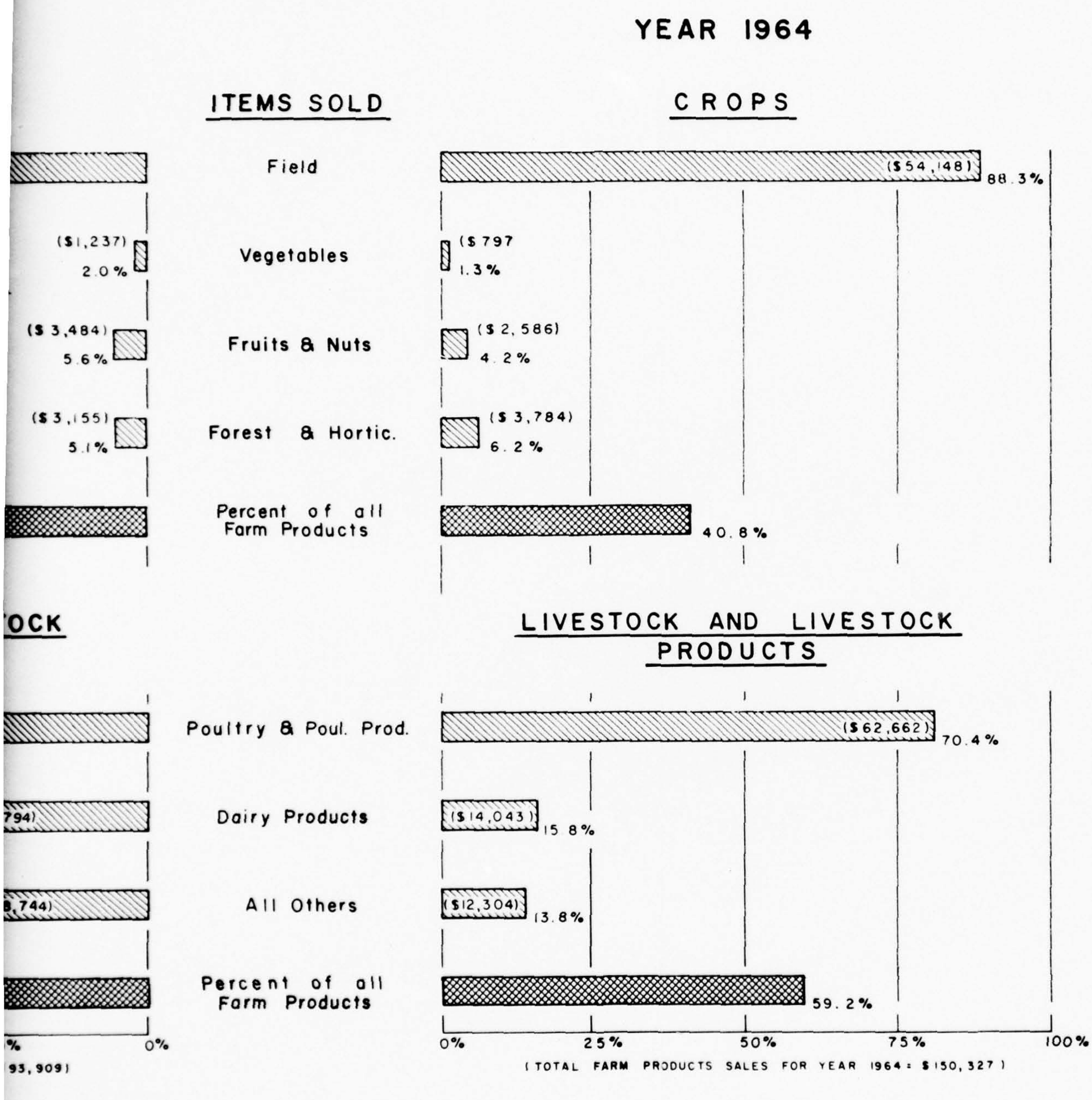
Forest land comprises more than one-half of the 6.8 million acres of land in the Sub-region, and about 98 percent of the forest land is classified as commercial (see Appendix A, particularly Tables I, VIII, IX, and X for more details). In 1962 the Sub-region had 3,009 million cubic feet of merchantable timber. Softwood growing stock comprises 1,181 million cubic feet and hardwoods 1,828. Softwood sawtimber accounts for 2,635 million board feet and hardwoods 4,595. About 50 percent of the commercial forest area is less than 70 percent stocked.

YEAR 1949



VALUE OF ALL FARMS PRODUCTS SOLD, 1949
WATER SUB-REGION "D"
(Adjusted by wholesale commodity price index (1957-

NOTE
FARM PRODUCTS IN THOUSANDS OF DOLLARS
SOURCE - U. S. CENSUS OF AGRICULTURE



F ALL FARMS PRODUCTS SOLD, 1949 AND 1964
WATER SUB-REGION "D"
djusted by wholesale commodity price index (1957-59=100)

The net annual timber cut from gowing stock is 88 million cubic feet. In 1962, the volume of timber products output was 59 million cubic feet of saw logs, veneer logs, and miscellaneous products; 26 million cubic feet of pulpwood; and 17 million cubic feet of fuel wood. The total estimated value of the output was $30.0 million.

Employment in mining has been static in the Sub-region for the last two decades, and income and employment in this industry are relatively insignificant. Fuel minerals are practically non-existent. Mineral production is largely confined to building stone, aggregate, gravel, and sand; production fluctuates with activity in the construction industry.

With over 40 percent of the Sub-region's employed force engaged in manufacturing, manufacturing employment exceeds the national average of about 25 percent. Manufacturing is weighted heavily in the non-durable sector, particularly in Water Area D-2. Manufacturing, in 1962, accounted for about 60 percent of the Sub-region's private non-farm wage and salary income. In 1960, 61 percent of the workers in Water Area D-2 were in textiles, while about only 37 percent of those in Water Area D-1 were so employed. The other important manufacturing sectors include: furniture, and lumber and wood products; apparel and fabricated textiles products; tobacco and food processing -- all of which are dependent on inputs from agriculture and forestry.

Value added per worker is about 65 percent of the national average. Hence, there are many activities whose low productivity is profitable, largely because of the relatively low prevailing wages. However, in the last decade most growth has occurred in the durable goods sector with correspondingly higher wage patterns.

Commerce (mainly wholesale and retail trade) accounted for about 14 percent of the Sub-region's employment in 1960 and about 14 percent of the wage and salary income in the private non-farm sector.

The Sub-region has not developed a mature service-producing sector, a reflection of the low income levels and the prevalence of a large rural population. In 1960, service activities employed 34.1 percent of workers nationwide, while only 18 percent of those in Sub-region D were so employed.

The Sub-region's government employment of 13 percent in 1960 was about the same as that of the nation.

Employment estimates somewhat disguise the extent of the unemployment problem since much of the labor force is gainfully employed only seasonally, although considered statistically as working year-round. The 1965 national unemployment figure of 5.1 per 100 persons in the work force was surpassed only in McDowell County, North Carolina (7.3), Ashe County, North Carolina (6.5) and Cherokee County, South Carolina (6.0) (see Figure 7-11).

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A more informative indicator of employment problems are the rates of population change and outmigration.*/ Six of the 23 counties experienced population decline between 1950 and 1960:

Ashe Co., North Carolina	-	9.6%
Madison Co., Georgia	-	8.1%
Alleghany Co., North Carolina	-	5.2%
Rutherford Co., No. Carolina	-	2.7%
Jackson Co., Georgia	-	2.6%
Polk Co., North Carolina	-	2.0%

Absolute gains are estimated for all counties during 1960-65, however, with the exception of Alleghany, Ashe and Polk, North Carolina.

A net in-migration was registered during 1950-60 in Forsyth County, North Carolina (10.1%) and Greenville Co., South Carolina (1.3%) and a net gain from in-migration for seven counties during 1960-65; Greenville, South Carolina, Burke, Caldwell, Davie, Forsyth, Wilkes and Yadkin, North Carolina.

In 1960. 32.2 percent of the Sub-region's families earned less than $3,000 per year, while nationally this group amounted to only about 22 percent. Comparative family money income for the Sub-region and the United States is shown in Figure 7-12. The Sub-region's 1960 per capita personal income was $1,628, while that of the United States was $2,215. A comparison of the sources of income by sector is presented in Figure 7-13.

Data in the 1966 investment plan for North Carolina,**/ covering 31 percent of all manufacturing employment in North Carolina Appalachia, indicate that Sub-region D has a substantial positive net export balance with respect to all states in the Southeast excepting South Carolina, North Carolina and Tennessee. With respect to areas of the United States outside the Southeast, it appears that the Sub-region has a modest positive export balance. The value of inputs purchased from the three-named states exceeds the value of outputs dispatched to them from the Sub-region.

Land, another major economic factor, is available for public uses. There are significant Federal holdings in the Sumter National Forest, Oconee County, South Carolina and in the Pisgah National Forest (in Caldwell, Burke and McDowell counties, North Carolina). National Forests

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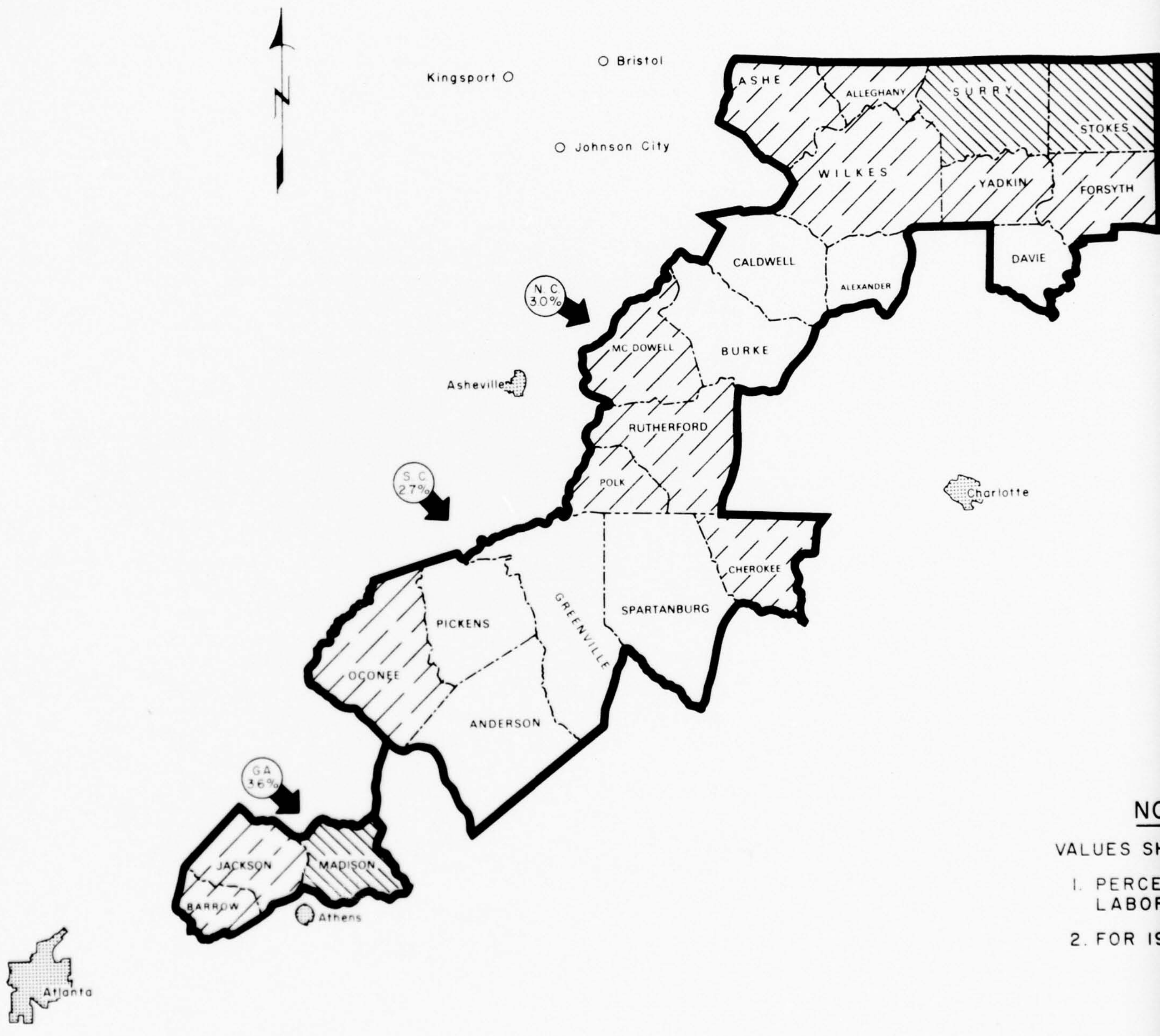
*/ Migration estimates attempt to evaluate those tendencies which may produce a relative population loss or gain in excess of natural population trends which are related solely to birth and death rates.

**/ Investment Guidelines for North Carolina Appalachian Region, Feb. 1967, prepared by Hammer, Greene and Siler Associates.



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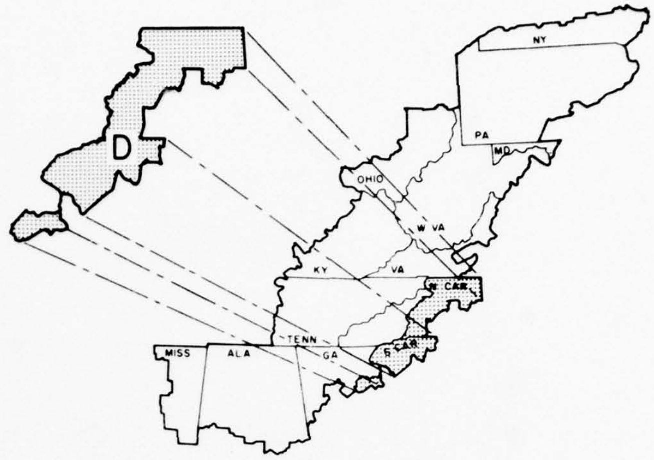
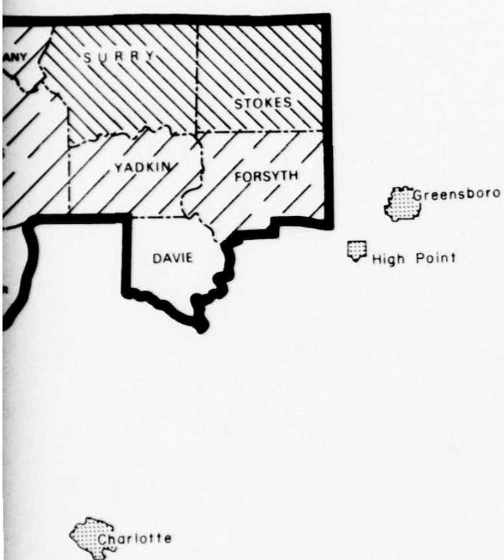
VALUES SHOW

1. PERCENT
LABOR F

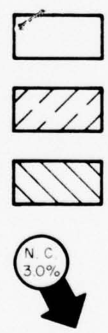
2. FOR 1966



VICINITY MAP



LEGEND



COUNTIES HAVING LESS THAN 3.0%

COUNTIES HAVING 3.0% – 4.9%

COUNTIES HAVING 5.0% – 6.4%

TOTALS IN SUB-REGION, BY STATE

NOTE

VALUES SHOWN ARE:

1. PERCENTAGE OF CIVILIAN LABOR FORCE
2. FOR 1966

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION D

UNEMPLOYMENT

OFFICE OF APPALACHIAN STUDIES JUNE 1968

 FIGURE 7-11

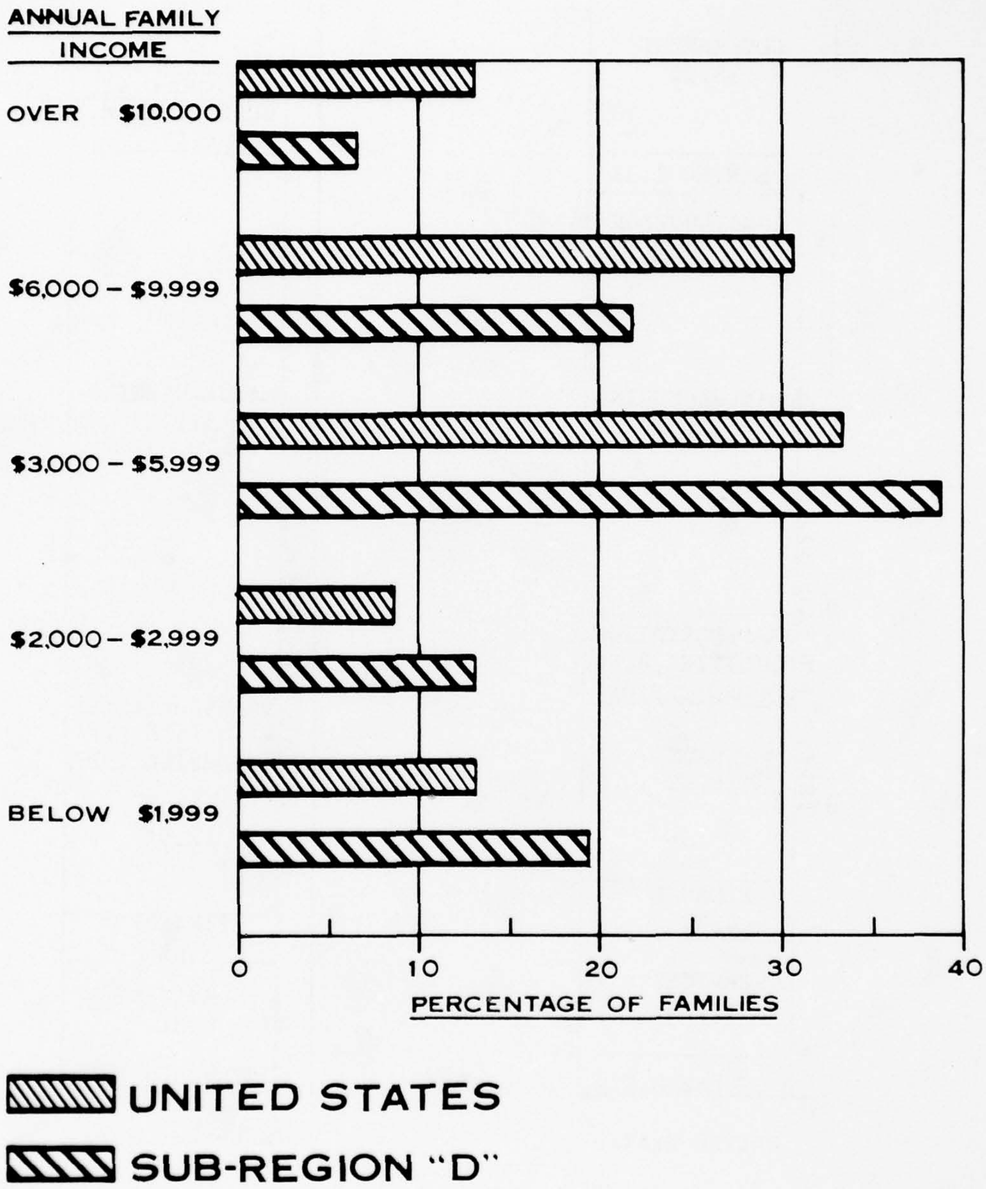


FIGURE 7-12 FAMILY INCOME

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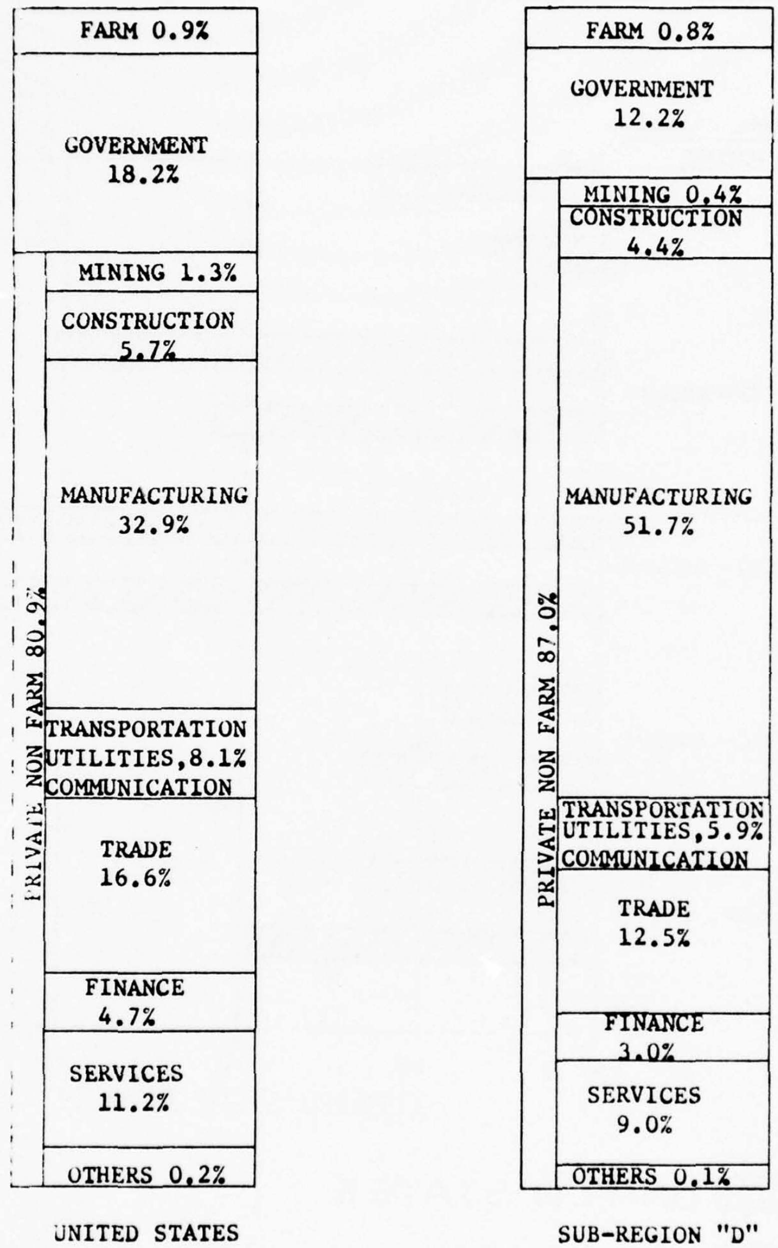


FIGURE 7-13 SOURCES OF INCOME

account for 253,000 acres, all available for public recreation use. About 16,000 acres are owned by the states and in state park use. Thus, about 269,000 acres or 4 percent of the total land area is in public ownership. To help sustain the local tax base, it is the policy of both the Federal and state agencies that maintain and manage forests to return about 25 percent of all revenues to the counties concerned.

Capital Availability - Capital funds flow from a number of public and private sources. In the framework of Appalachian development are various programs which provide developmental capital for public facilities, health, education and other purposes which serve to stimulate private investment and thereby employ economic factors of production.

Private and quasi-private financial institutions are in existence in the Sub-region (see Figure 7-14) to facilitate the inflow of capital to meet investment opportunities.

Local Attitudes - A positive attitude towards healthy economic growth exists in the sub-region. The natural conservative reluctance to change is present and in some places resistance to economic development, due to a fear of rising wage rates, is evident. However, the success and momentum of current development indicates the area basically desires and is equipped to facilitate orderly growth.

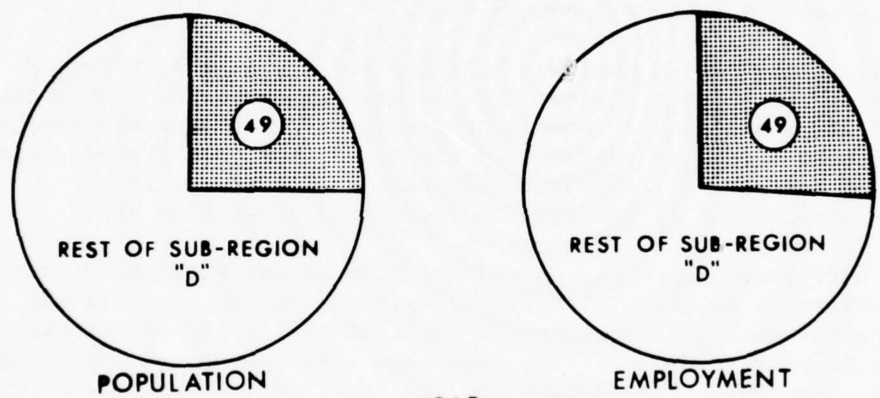
State governments in the Sub-region have actively promoted industrial development by permitting favorable tax policies, by actively developing the work force to provide required skills and by pursuing other public programs which would encourage development. Cooperating with State governments, railroads and public utilities and rural development commissions have contributed their parts by providing site information, mobilizing labor forces, assisting in financing and otherwise assuring prospective industries of a hospitable environment.

Two major economic trends have contributed to the interest in growth policies: (1) the sharp declines in agricultural employment which have followed the tremendous gains in agricultural productivity and shifts from cash crop to livestock farming; and (2) the strategy for upgrading incomes by upgrading manufacturing activities leading to a more effective mix. A conflict between interest groups is apparent when growth strategy is examined.

5. STATE PLANNING SUB-REGIONS

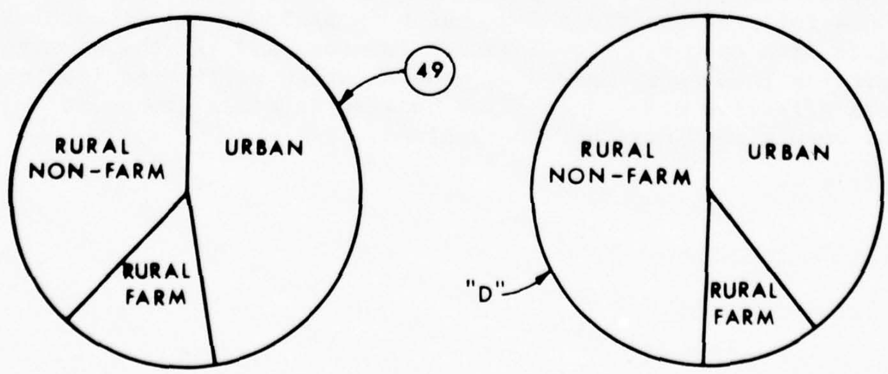
The delineation of state planning sub-regions within Water Sub-region D has been described previously and is indicated on figure 7-9. The state planning sub-regions represent the basic planning unit for the Appalachian Survey. Graphical comparisons of the state planning sub-regions with the water sub-region has been included in each of the following sections to aid in orienting the reader to the state planning sub-region.

State Planning Sub-region 49 - The five northeastern counties of Water Area D-1 - Davie, Forsyth, Stokes, Surrey, and Yadkin - are homogeneous in type but heterogeneous in degree of development. (See Figure 7-9.) Textiles and tobacco dominate the economies of all counties, but distinct relative differences in stages of development are apparent. The area is economically oriented to, and dependent upon, Winston-Salem, a primary growth center.

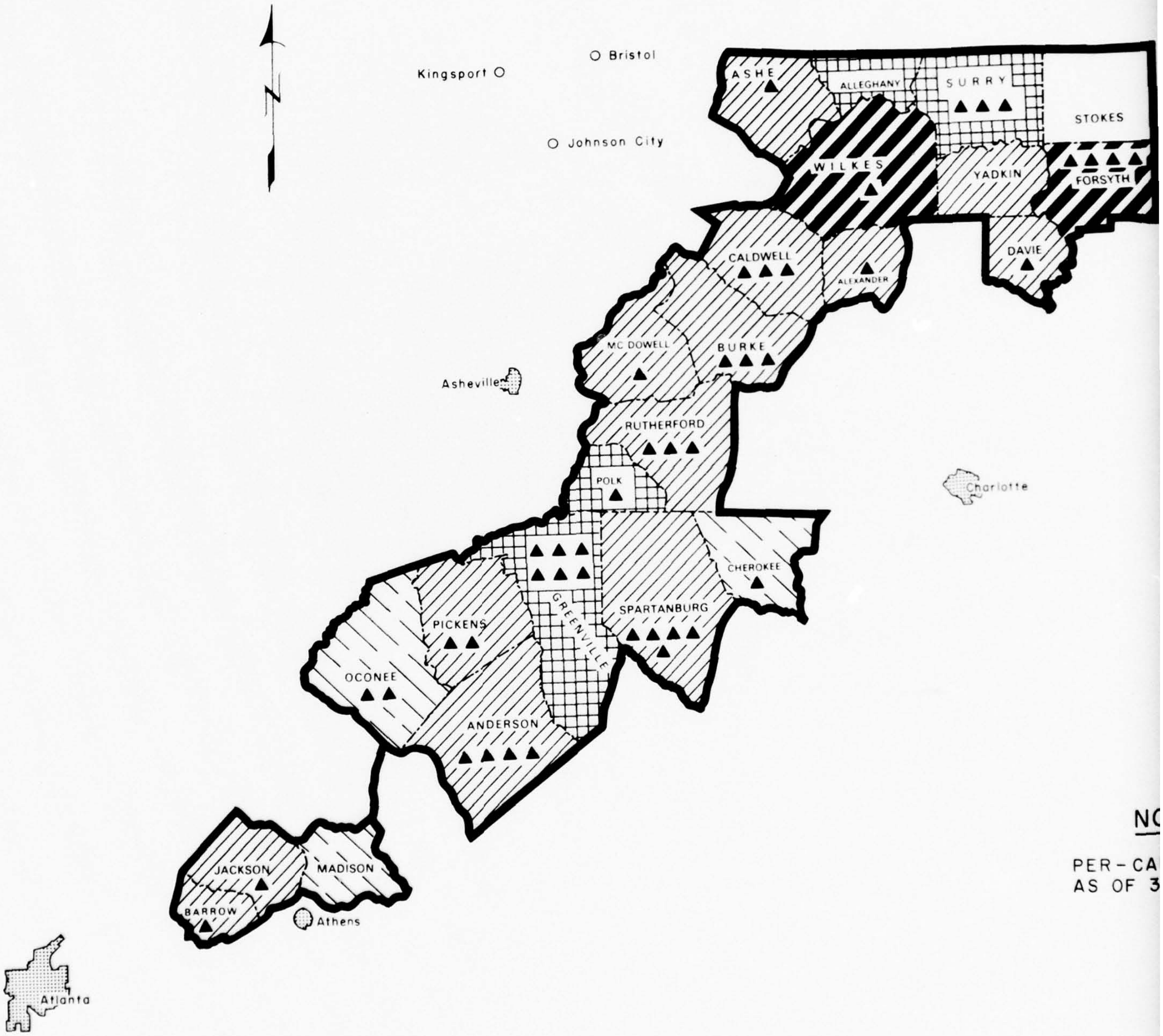


1965

Although the population within the region is increasing, major growth has occurred only in the Winston-Salem Standard Metropolitan

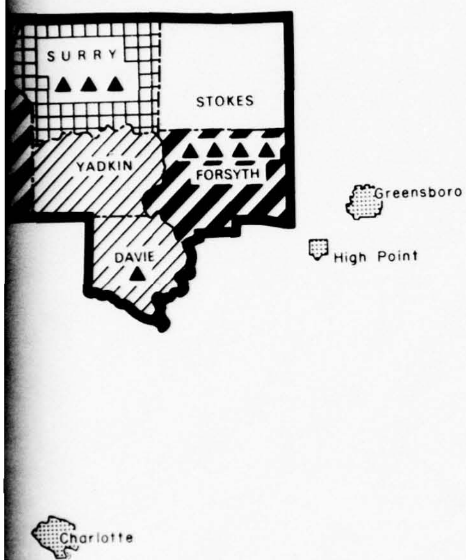


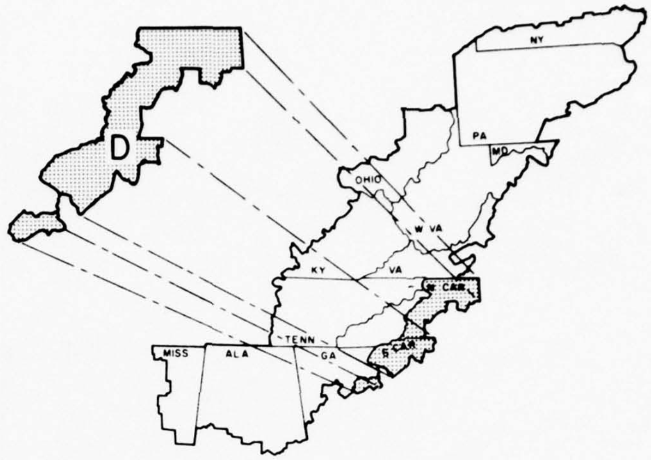
URBAN-RURAL
POPULATION DISTRIBUTION



NC

PER-CA
AS OF 3





VICINITY MAP

LEGEND

▲ SAVINGS & LOAN ASSOCIATIONS

BANK DEPOSITS, PER-CAPITA BY COUNTY:

- LESS THAN $300
- $300 – $499
- $500 – $799
- $800 – $999
- $1000 OR MORE

NOTE

PER-CAPITA DEPOSITS AS OF 30 JUNE 1966

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION D

FINANCIAL SITUATION

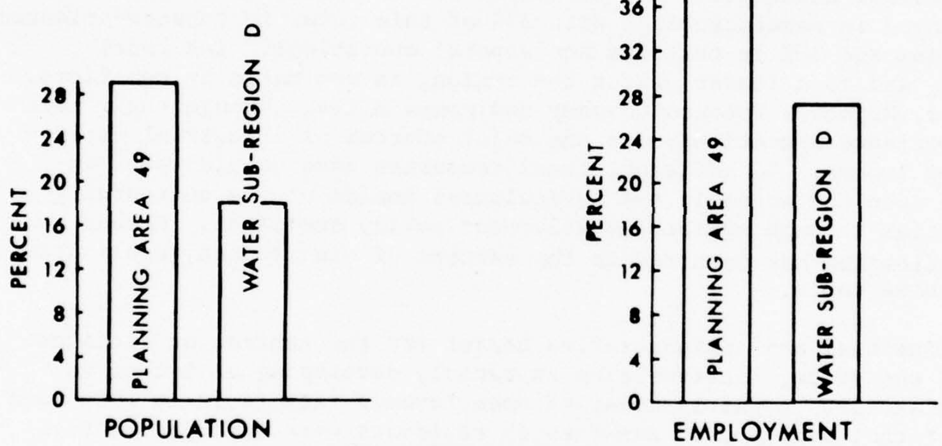
OFFICE OF APPALACHIAN STUDIES JUNE 1968

II-7-47 FIGURE 7-14

Statistical Area (SMSA). Regional population growth from 1960 to 1966 was estimated at 30,400 persons, or approximately 10%. Population in the SMSA increased 27,700 from the 1960 figure of 189,428 to an estimated 217,200 in 1966, a 12% growth. Winston-Salem/Forsyth County will continue to dominate area growth, with a projected population in 2020 of 485,000, */ over 80% of area totals.

Although all area counties exhibited positive population gains from 1950-1960, outmigration rates were high except in Forsyth; the Winston-Salem area had a population increase of 10% from migration, the highest in Water Sub-region D, and the largest relative population growth, 29.6%. The majority of persons leaving surrounding counties settled in Winston-Salem.

Real unemployment in all counties is below state, Appalachian, and national averages. Disguised unemployment among males persists in rural areas.



CHANGES 1950-65

Median family income in Forsyth ($5,544) is the highest in Sub-Region D, and approaches the national average ($5,660); nearly 73% of all families earn in excess of $3,000. Among other area counties, only Davie ($4,204) surpasses the state figure ($3,956).

The average educational attainment is greatest in Forsyth (10.3 years). Other counties are below the state level (8.9 years).

Employment within the region is not heavily concentrated in any one sector; the diversified nature of the Winston-Salem economy tends to disguise the dependence of rural counties on textile manufacture and on

*/ As estimated by local planning officials.

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agriculture. The 1960 work force was most heavily concentrated in textile and apparel operations; almost 15% of the 119,000 employed persons are in this sector. Agriculture, primarily the production of tobacco, and the tobacco industry account respectively for over 10% of total area employment. Other significant employment sectors include the electrical and machinery products industries.

Area transportation facilities are adequate except in the mountainous areas of Stokes and Surry Counties; the absence of rail facilities in Yadkin County has had a detrimental effect on development.

Winston-Salem - Much of north central North Carolina is dominated economically by Winston-Salem, a primary growth center. Historically a textile- and tobacco-processing area, the Winston-Salem/Forsyth County complex has continued to develop along traditional lines.

The 1965 Winston-Salem SMSA population, 213,700, like the other major economic centers in the Sub-region, is heavily dependent upon manufacturing activities. An estimated 39% of the civilian labor force is employed in manufacturing, with 37% of this total in tobacco-oriented industries and 30% in textiles and apparel operations. The local economy, and to a lesser extent the region, is dominated by two firms. The R. J. Reynolds Tobacco Company and Hanes Mills, through their main and associated operations, are the major sources of industrial employment and income. In addition, these companies have considerable influence upon the economic and agricultural health of the surrounding communities through business-development policy decisions. Recent diversification has occurred in the sectors of electronics, appliances, and machine tools.

A financial and administrative center for the central or Piedmont area of the state, Winston-Salem is rapidly developing an intensive service sector. A fairly constant unemployment rate (4.3% in 1965) and the fact that over 10,000 non-Forsyth residents were employed in the SMSA in 1960 (14% of all persons employed) suggests that work opportunities are available and unemployment is not a serious problem. Although typically low-skilled industries dominate the economy, a semi-skilled labor force is developing. In most sectors, wages are approaching national averages.

Forsyth and Winston-Salem have been integrated into the regional transportation networks. In addition to a major east-west interstate highway, a number of controlled-access roads provide connections with the large towns in surrounding counties. No major physical deterrents to growth are identified.

Population forecasts* by local planning officials illustrate the size of growth expected in Forsyth County to the year 2020:

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* No projections of growth for the various economic sectors exist from this source.

1970	234,800
1980	284,000
1990	333,000
2000	385,000
2010	435,000
2020	485,000

Mount Airy - Surry County has experienced more extensive growth than the other area counties, with the exception of Forsyth. A textile-oriented industrial base and a tobacco-dependent agriculture are the major sources of employment and income, although relatively significant diversification has evolved. Growth in Surry County is concentrated in Mount Airy, which is established as a secondary growth center. An early dependence upon textile manufacturing has been reduced with the establishment of furniture construction, plastics and appliance industries.

The internal road network, while not excellent in quality, does satisfy local traffic demands and is fairly dense. A four-lane, controlled access road (US 52) between Mount Airy and Pilot Mountain to Winston-Salem and nearby areas to Interstate 77 allows for rapid highway transport. Rail service is available to all major towns. The Mt. Airy area suffers from the lack of adequate water-distribution and sewer systems, as peripheral areas are not served.

Elkin-Jonesville - Elkin-Jonesville is also defined as a secondary growth center. This area has developed an intense dependence upon textiles, almost to the extent where the economy is dominated by one firm - Chatham Manufacturing Company. The completion of Interstate 77, the major route between Charlotte and the midwest manufacturing belt, should greatly enhance development potentials.

However, fairly rugged terrain and local flooding limit developable areas.

The following tabulation summarizes the most recent census data for the State Planning Sub-region.

NORTH CAROLINA - SUB-REGION 49

ESTIMATED POPULATION 1966	
Total	329,900
Absolute Change 1960-1966	30,400
Percent Change 1960-1966	10.15

POPULATION 1960

	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	299,479	145,190	154,289	44,482	113,956	141,041
Percent Distribution	100.00	48.48	51.52	14.85	38.05	47.10
Percent Change 1950-1960	19.41	18.72	20.06	-36.04	57.93	29.28

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	12,588	8,174	27,911	19,912	7,554	76,139
Percent Distribution	16.53	10.74	36.66	26.15	9.92	100.00
Percent Change 1950-1960	-46.43	-37.29	60.55	513.62	516.65	21.58

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	159,861	73,465	60,729	21,330
Percent Distribution	100.00	45.96	37.99	13.34
Percent Change 1950-1960	21.06	1.42	56.58	62.51

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unem-ployed	Employed	Unem-ployed	Employed	Unem-ployed
Number	118,721	4,466	75,845	2,114	42,876	2,352
Percent Distribution	96.37	3.63	97.29	2.71	94.80	5.20
Percent Change 1950-1960	21.29	56.31	11.33	38.35	44.08	81.90

RATE OF UNEMPLOYMENT, 1962-65

1962	5.1
1963	5.7
1964	4.6
1965	4.0

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	123,415	86,629	78,187	21,585	45,228	65,044
Percent Distribution	58.76	41.24	78.37	21.63	41.01	58.99
Percent Change 1950-1960	22.48	8.99	12.17	29.19	45.60	3.61

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

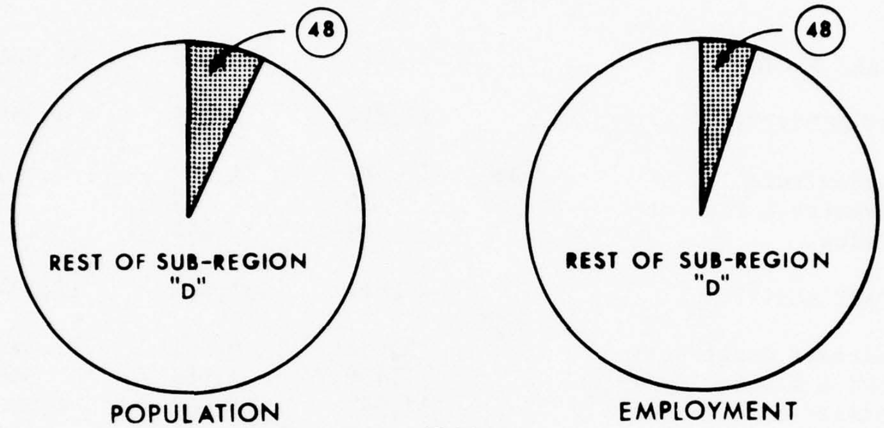
	1965 Number	Chng. 1962-65 No.	%
Tot. Work Force	141.2	5.0	3.7
Tot. Employment	135.5	6.2	4.8
Unemployment	5.7	-1.2	-17.4

NORTH CAROLINA - SUB-REGION 49

EMPLOYMENT

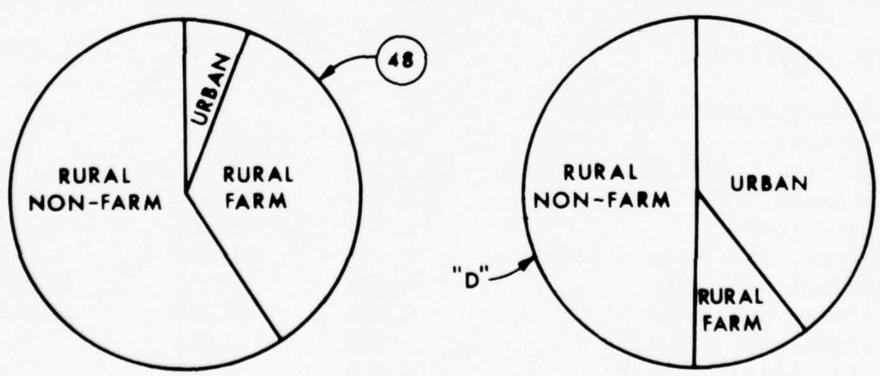
	1950	1960	Absolute Change
TOTAL ALL SECTORS	97,945	118,949	21,004
PRIMARY ACTIVITIES	17,814	12,459	- 4,355
Agriculture	17,491	12,002	- 5,489
Forestry & Fisheries	10	23	13
Mining	313	434	121
SECONDARY ACTIVITIES	40,617	53,911	13,294
Contract Construction	5,632	6,661	1,029
Food & Kindred Products	1,438	1,984	546
Textile Mill Products	12,040	16,068	4,028
Apparel	1,438	1,590	152
Lumber, Wood Products, Furniture	4,461	3,710	- 751
Printing & Publishing	616	1,000	384
Chemicals & Allied Products	167	203	36
Electrical & Other Machinery	2,176	7,520	5,344
Motor Vehicles & Equipment	57	69	12
Other Transportation Equipt.	12	20	8
Other & Miscellaneous	12,580	15,086	2,506
TERTIARY ACTIVITIES	37,615	48,909	11,294
Transportation & Communications	3,848	5,487	1,639
Utilities & Sanitary Service	704	682	- 22
Wholesale Trade	1,946	2,374	428
Retail Trade	11,529	13,847	2,318
Finance, Ins. & Real Estate	1,897	2,910	1,013
Personal Services	8,279	9,353	1,074
Professional Services	6,268	10,710	4,442
Recreational Services	512	523	11
Public Administration	2,569	2,795	226
Armed Forces	63	228	165
NOT REPORTED	1,899	3,670	1,771

State Planning Sub-Region 48 - While all other planning sub-regions are situated in the Piedmont, the counties of Alleghany, Ashe, and Wilkes, which comprise State Planning Sub-region 48, are mountain-oriented and constitute the counties most characteristically Appalachian in Sub-region D. Although Wilkes is experiencing both absolute and relative growth, economic problems are acute in Alleghany and Ashe Counties.



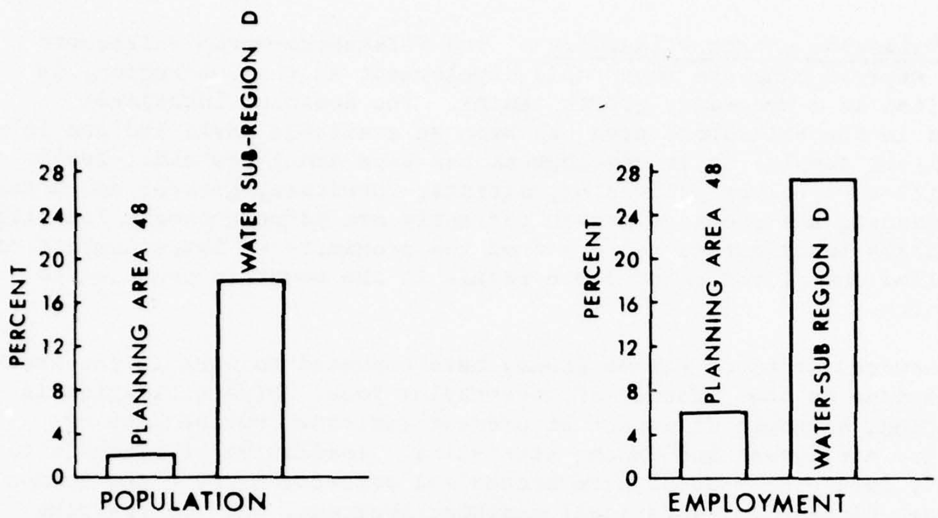
1965

The 71,200 persons in the three-county area in 1960 were predominately rural. Sixty-five percent were classed as rural non-farm and an additional thirty percent were rural farm. The Wilkesboro/North Wilkesboro area is the only urban place.



URBAN - RURAL
POPULATION DISTRIBUTION

Population loss through outmigration is common. Between 1950 and 1960, Alleghany and Ashe registered net losses of 5.2% and 9.6% respectively; Wilkes County showed a gain of only 0.1%. Estimated losses from 1960-1966 numbered over 1,500, or 2.2% of total area population.



CHANGES 1950-65

Unemployment problems are also apparent. The 1965 unemployment rate was 5.3%. Although this represents a decline from the 1963 figure of 6.4%, unemployment remains in excess of the North Carolina State average (4.5%).

Income levels reflect a combination of the unemployment problem and the dominance of agriculture and low-skill industries in the economy. Almost 52% of area families earn less than $3,000 per year; over 34% have incomes of under $2,000. Median family income levels are lowest in Ashe $2,296) and Alleghany ($2,910) Counties.

Most employment in 1960 was in low-skill, low-wage activities. The work force was concentrated in agriculture (19%); lumber, wood products, and furniture (15%); and textile mill products and apparel (14%). Major agricultural products include beef, dairy products, poultry, grains, and corn.

Development has been hindered in Alleghany and Ashe by a lack of accessibility. Highways from the north, southeast, and southwest provide Federally supported access to the region, but the poor quality and circuitous nature of these roads is reflected in low traffic volumes. The internal road network is similarly low-quality and incomplete, resulting in difficult intra-county and intra-regional movement. Rail service is available only to the Jefferson-West Jefferson area in Ashe County; excessive grades in Alleghany and remaining areas of Ashe preclude railroad construction. Large tracts of industrial land are lacking even with flood control. Small sites in Sparta and Jefferson-West Jefferson are available, with various degrees of accessibility and available facilities. Rural industrial locations in general suffer from poor highway linkages and the unavailability of water and sewer facilities. Most development has been in textiles, apparel and furniture; a minor electrical-parts assembly plant has been established in Ashe County.

Wilkesboro-North Wilkesboro - The Wilkesboro-North Wilkesboro area, experiencing the most rapid development in the Sub-region, is delimited as a secondary growth center. The dominant locational factor in the Wilkesboro area has been an available unskilled and low-wage labor supply; major development has been among low skill-level activities - poultry processing, mirrors, furniture, gloves, and shoes. Experiencing the greatest growth currently are garment-sewing industries. The Wilkes labor market suffers from the proximity of large numbers of unskilled unemployed persons who reside in the mountain counties to the north.

Non-residents of Wilkes County have commuted to work in the area in response to the presence of wage-paying jobs. Diversification is appearing, although it is not at present indicated by absolute or relative employment and income statistics. Indicative of attempts to satisfy future demands of more mechanized activities are a new community college, high-school vocational training programs, and job training opportunities offered by local industry.

Local flooding and the surrounding mountains have tended to restrict developable lands. Although space is not a major barrier to growth in the immediate future, long-range development may be hindered.

The following tabulation summarizes the most recent census data for the sub-region.

NORTH CAROLINA - SUB-REGION 48

ESTIMATED POPULATION 1966	
Total	71,200
Absolute Change 1960-1966	-1,600
Percent Change 1960-1966	- 2.20

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	72,771	36,223	36,548	21,363	47,211	4,197
Percent Distribution	100.00	49.78	50.22	29.36	64.88	5.76
Percent Change 1950-1960	-3.33	-4.37	-2.28	-54.67	98.59	-4.16

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	6,219	3,096	6,136	1,940	585	17,976
Percent Distribution	34.60	17.22	34.13	10.79	3.25	100.00
Percent Change 1950-1960	-45.71	16.61	239.94	708.33	431.82	5.59

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	37,661	23,497	10,294	2,572
Percent Distribution	100.00	62.39	27.33	6.83
Percent Change 1950-1960	3.49	-7.98	49.40	28.92

e
Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	23,703	1,218	16,800	809	6,903	409
Percent Distribution	95.11	4.89	95.41	4.59	94.41	5.59
Percent Change 1950-1960	-0.44	116.34	-13.83	113.46	60.09	112.28

RATE OF UNEMPLOYMENT, 1962-65

1962	5.6
1963	6.4
1964	6.0
1965	5.3

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	24,925	25,528	17,613	7,048	7,312	18,480
Percent Distribution	49.40	50.60	71.42	28.58	28.35	71.65
Percent Change 1950-1960	2.23	-2.60	-11.42	32.88	-62.56	-11.60

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

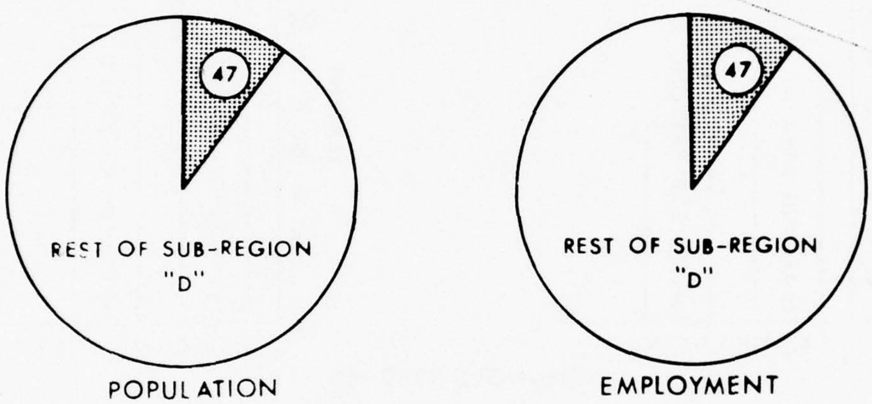
	1965 Number	Chng.1962-65 No.	%
Tot.Work Force	26.7	1.5	6.0
Tot.Employment	25.3	1.5	6.3
Unemployment	1.4	0	0

NORTH CAROLINA - SUB-REGION 48

EMPLOYMENT

	1950	1960	Absolute Change
TOTAL ALL SECTORS	23,819	23,707	- 112
PRIMARY ACTIVITIES	10,092	4,679	- 5,413
Agriculture	10,029	4,484	- 5,545
Forestry & Fisheries	12	8	- 4
Mining	51	187	136
SECONDARY ACTIVITIES	6,997	10,684	3,687
Contract Construction	1,467	1,533	66
Food & Kindred Products	282	663	381
Textile Mill Products	1,166	2,206	1,040
Apparel	431	1,147	716
Lumber, Wood Products, Furniture	2,993	3,487	494
Printing & Publishing	50	96	46
Chemicals & Allied Products	6	7	1
Electrical & Other Machinery	33	577	544
Motor Vehicles & Equipment	6	4	- 2
Other Transportation Equipt.	2	4	2
Other & Miscellaneous	561	960	399
TERTIARY ACTIVITIES	6,272	7,927	1,655
Transportation & Communi-cations	480	649	169
Utilities & Sanitary Service	105	81	- 24
Wholesale Trade	383	407	24
Retail Trade	2,220	2,707	487
Finance, Ins. & Real Estate	141	240	99
Personal Services	1,334	1,468	134
Professional Services	1,043	1,644	601
Recreational Services	69	51	- 18
Public Administration	486	676	190
Armed Forces	11	4	- 7
NOT REPORTED	458	417	- 41

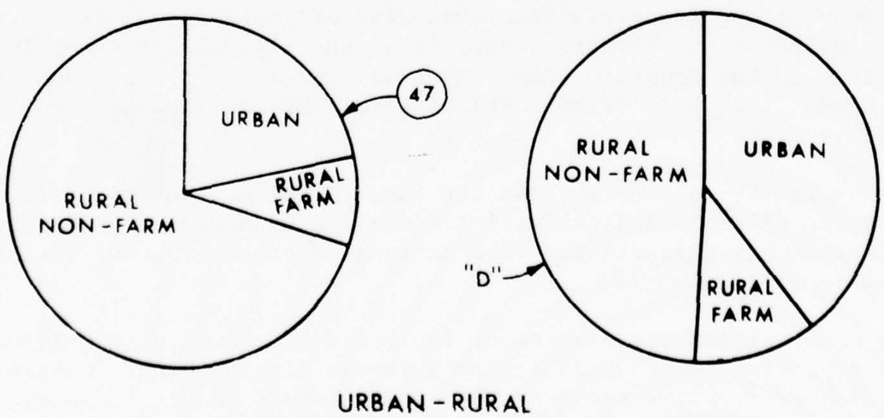
State Planning Sub-Region 47 - While development in the Blue Ridge section of Water Area D-1 has focused on the Wilkesboro/North Wilkesboro area, growth in the counties of Alexander, Burke, and Caldwell has been more extensive. Emerging as fairly dense development complexes are the immediate Lenoir area and contiguous sections of southern Caldwell, and Morganton and southern Burke, along the Interstate Highway 40 corridor; northern Burke and Caldwell are fairly undeveloped. Alexander County has not yet experienced the growth of other Piedmont counties, although some development is appearing, the rate of advancement is somewhat slower than in other areas.



1965

Furniture and textile industries, concentrated in Burke and Caldwell Counties, account for a major portion of employment and income. In 1960, 24 1/2% of the employed labor force was engaged in the lumber-wood products-furniture sector. Textile mill and apparel industries accounted, similarly, for 24 1/2%.

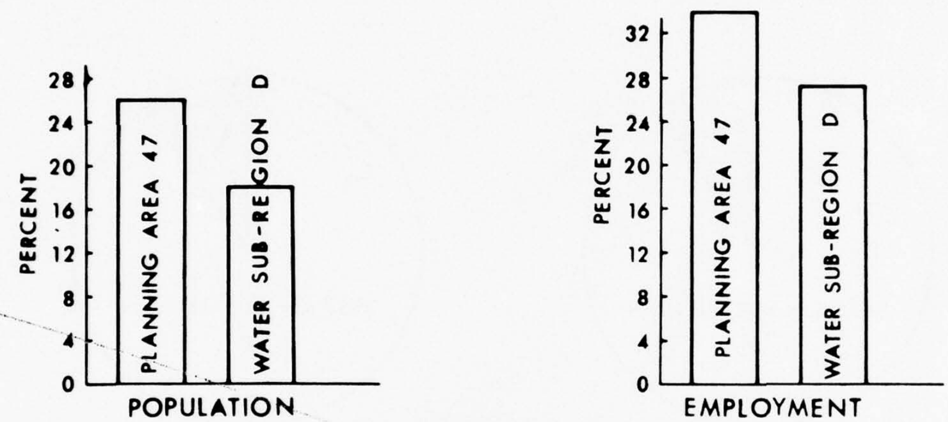
The urbanizing influence of furniture-textile development is illustrated by the relatively low level of rural farm population; only 8 1/2% of the area population was so classed, in 1960, a decline of



URBAN - RURAL
POPULATION DISTRIBUTION

almost 67% since 1950. Growth has occurred in urban and rural non-farm population categories, these sectors accounting for 21% and 70% of area population, respectively.

Although all counties recorded population losses through outmigration between 1950 and 1960, only Alexander registered a net population loss (5.2%). Net population gains occurred in Burke (15.8%) and Caldwell (13.2%), the third and fifth highest gains in the Sub-region.



CHANGES 1950-65

All counties recorded net losses of workers through commuting. Out-commuters from Alexander account for some 28% of the employed residents; from Burke, 6%; and from Caldwell, 2 1/2%. In each case, non-Appalachian Catawba County (Newton) is the major employment center.

Unstable labor demands are reflected by fluctuating rates of unemployment. From 1964 to 1965, unemployment more than doubled from 4.1 to 8.6%. As in all Piedmont areas, underemployment and the sub-optimal use of labor, especially farm labor, is apparent in employment statistics.

Because of the industrialized character of the economy, the pattern of income distribution is more favorable in the Alexander-Burke-Caldwell section than in the mountain areas, however. Only 16% of the families had an income less than $2,000; 44% of area families earn between $3,000 and $6,000.

Median family incomes surpass the North Carolina average of $3,956 in both Burke ($4,303) and Caldwell ($4,054); Alexander ($3,814) also closely approaches this figure. The national average ($5,660) remains in excess of area averages.

The national and state averages for years of education completed, 10.6 and 8.9, also exceed this region's levels of attainment. Alexander, with a 7.8-year average, rates as the second lowest county in Water Area D-1; Burke and Caldwell register 8.3 and 8.1 years, respectively.

Land suitable for industrial growth is abundant and available. Industrial sites with rail and highway proximity, in addition to sewer and water facilities, are numerous in southern Burke and Caldwell, and in eastern Alexander.

Two sub-region towns, Lenoir and Morganton, have been designated secondary growth centers.

Lenoir - The town of Lenoir is one of the major wood-furniture centers in the nation. The rapid expansion of the furniture industry in recent years has had a profound effect on the area's economy. As some degree of worker training is required, the resident work force is developing skills that may be applied in industries requiring advanced technology. An extensive diversification has yet to occur, but it is being forecast for the area. Corresponding growth is taking place in furniture-linked and tertiary activities, and Lenoir is developing into a minor service center for the northwest mountain area.

Because of the mountains in North Caldwell County, expansion has followed Highway 321 to the south. Lenoir composes the northern portion of what is rapidly evolving into a strip- or sprawl-type city, in a triangle with Hickory and Morganton. Large-scale future growth in furniture is projected for this triangle area.

Morganton - The other secondary growth center in Sub-region 47 is Morganton. Accessibility provided by Interstate Highway 40, and the established industrial base in Morganton are primary factors in this designation.

Morganton has developed both textile-apparel and furniture operations intensively; recent growth has occurred in electrical parts and machinery industries. Due to the proximity of Lenoir and Hickory, the service sector has not developed relative to industry. Services necessary for industrial growth are available in Morganton; but expansion into other areas is not feasible now because of scale economies and agglomerative forces which explain much of the urban development.

Areas for growth continue along highways to Hickory and Lenoir.

The following tabulation presents the most recent census data for the sub-region.

NORTH CAROLINA - SUB-REGION 47

ESTIMATED POPULATION 1966	
Total	126,900
Absolute Change 1960-1966	9,000
Percent Change 1960-1966	7.63

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	117,878	57,720	60,158	10,095	82,755	25,028
Percent Distribution	100.00	48.97	51.03	8.56	70.20	21.23
Percent Change 1950-1960	13.98	12.97	14.95	-66.85	53.13	32.22

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	4,709	4,223	12,546	5,668	1,427	28,573
Percent Distribution	16.48	14.78	43.91	19.84	4.99	100.00
Percent Change 1950-1960	-53.05	-23.77	139.20	844.67	596.10	27.16

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	60,989	33,893	19,564	5,748
Percent Distribution	100.00	55.57	32.08	9.42
Percent Change 1950-1960	21.65	5.18	70.20	48.14

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	44,839	1,661	28,905	804	15,934	857
Percent Distribution	96.43	3.57	97.29	2.71	94.89	5.11
Percent Change 1950-1960	23.32	58.04	12.14	23.88	50.55	113.18

RATE OF UNEMPLOYMENT, 1962-65

1962	5.2
1963	4.8
1964	4.1
1965	8.6

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	46,524	35,366	29,733	9,789	16,791	25,577
Percent Distribution	56.81	49.19	75.23	24.77	39.63	60.37
Percent Change 1950-1960	24.29	7.12	12.44	24.80	52.80	1.61

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

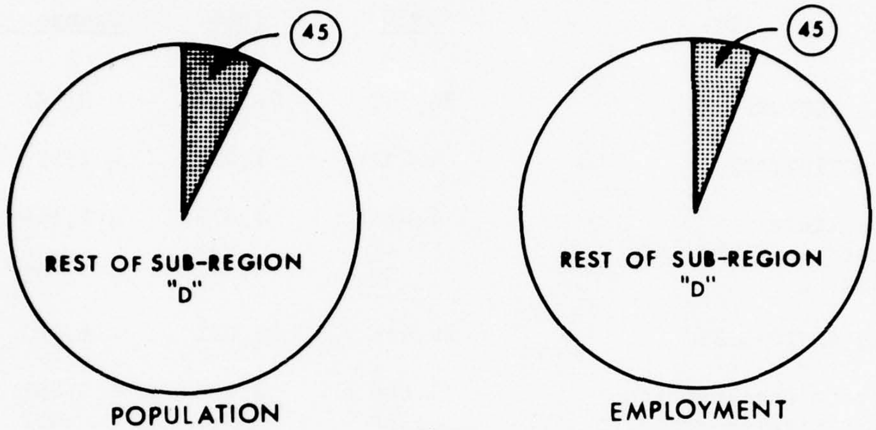
	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	53.8	7.2	15.5
Tot. Employment	49.2	5.0	11.3
Unemployment	4.6	2.2	91.7

NORTH CAROLINA - SUB-REGION 47

EMPLOYMENT

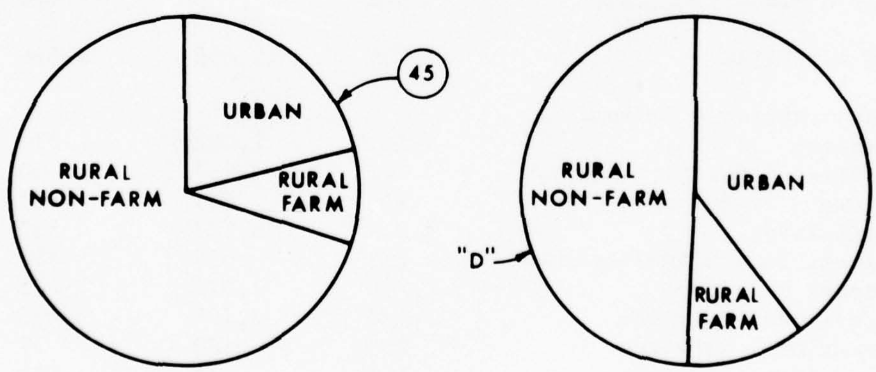
	1950	1960	Absolute Change
TOTAL ALL SECTORS	36,382	44,863	8,481
PRIMARY ACTIVITIES	4,498	1,922	- 2,576
Agriculture	4,423	1,875	- 2,548
Forestry & Fisheries	26	31	5
Mining	49	16	- 33
SECONDARY ACTIVITIES	20,416	27,021	6,605
Contract Construction	1,800	2,252	452
Food & Kindred Products	289	741	452
Textile Mill Products	8,309	9,276	967
Apparel	554	1,668	1,114
Lumber, Wood Products, Furniture	8,656	10,963	2,307
Printing & Publishing	110	189	79
Chemicals & Allied Products	130	104	- 26
Electrical & Other Machinery	185	729	544
Motor Vehicles & Equipment	4	8	4
Other Transportation Equipt.	1	5	4
Other & Miscellaneous	378	1,086	708
TERTIARY ACTIVITIES	11,103	14,698	3,595
Transportation & Communications	743	1,022	279
Utilities & Sanitary Service	247	257	10
Wholesale Trade	354	541	187
Retail Trade	3,843	4,373	530
Finance, Ins. & Real Estate	292	639	347
Personal Services	2,269	2,870	601
Professional Services	2,580	4,108	1,528
Recreational Services	206	189	- 17
Public Administration	547	675	128
Armed Forces	22	24	2
NOT REPORTED	365	1,222	857

State Planning Sub-Region 45 - The characteristic regional industrial mix of primary textile and furniture activities also exists in the McDowell-Polk-Rutherford Counties area. Unlike counties to the north, however, growth has been slow.



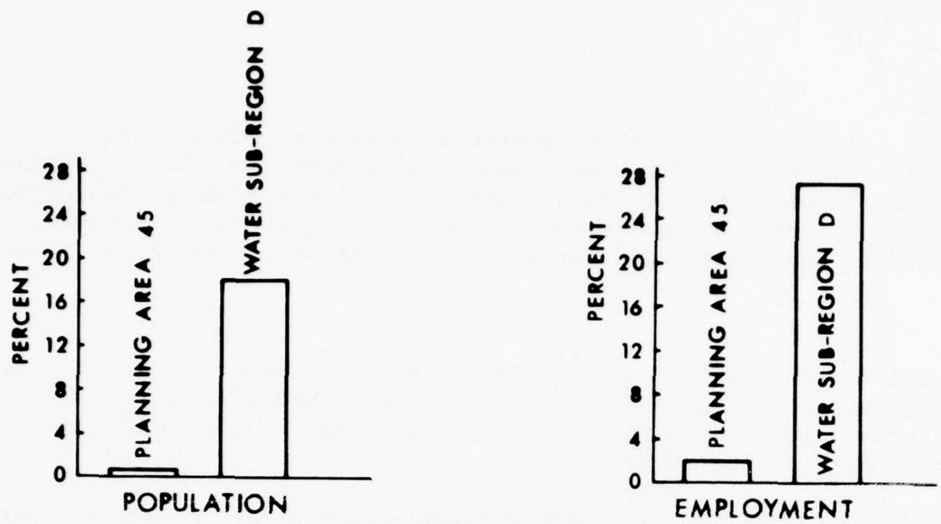
1965

Population losses through out-migration are common. From 1950-60, all counties registered relatively high rates of out-migration - McDowell, 16.0%; Polk, 13.6%; Rutherford, 17.4%. Absolute declines were registered in Polk (2.0%) and Rutherford (2.7%). The largest relative loss took place in rural farm population (75%), although a significant decline was apparent in urban places (18%); rural non-farm population increased 76%.



URBAN - RURAL
POPULATION DISTRIBUTION

In 1960, some 70% of the area population was classed as rural non-farm and 9% as rural farm; the remaining 21% were urban residents. The estimated 1965 population, 84,366, represents a slight increase (1%) from 1960, indicative of the continuing nature of the population problem.



CHANGES 1950-65

Between 1950 and 1960, total employment increased by only 78 workers, or 0.3%. Textile and apparel industries accounted for 38.9% of area employment; an additional 9.8% of the employed labor force were dependent upon timber, lumber, wood products, and furniture industries. Only 5.9% were employed in primary agriculture, a decline from the 1950 figure of 18.9%.

Regional unemployment has declined in recent years, from 6.4% in 1962 to 3.8% in 1965. Disguised unemployment,*/ primarily among rural males, is again not reflected in these figures. Real unemployment is most apparent among female workers.

In terms of income, although McDowell and Rutherford approach state averages, the median family level in Polk ($2,901) is third lowest among the counties in Sub-region D. Approximately 38% of area families earn an annual income of less than $3,000; 23% earn under $2,000.

The Marion-West Marion area in McDowell County and Rutherfordton-Spindale-Forest City in Rutherford County are the major areas of development, and have been established as secondary growth centers. The economic growth of the North Carolina furniture-textile counties and the South Carolina textile belt has not spread into Polk County. Limited industrialization has progressed in labor-oriented activities, primarily textiles and the processing of agricultural goods. The lack of local job availability requires almost one-fourth of all employed residents to commute to other counties, primarily Spartanburg, S. C., and Henderson and Rutherford, N. C. Administrative and professional employment opportunities are virtually nonexistent.

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*/ That unemployment which is normally omitted from statistical estimates of unemployment based primarily on claims against unemployment insurance.

Polk and McDowell Counties compare favorably to other counties in general accessibility. The road network in Rutherford County is adequate for present development but insufficient to handle sizable increases in tonnage and traffic volume. Urban services and facilities are generally inadequate in urban areas and nonexistent in peripheral and rural areas.

Marion

Textile and furniture industries dominate the Marion economy; only a slight diversification has occurred. Although McDowell attracts a sizable work force from surrounding rural counties, a small net commutation loss*/ is registered.

Numerous industrial sites are available, especially in the northern and western portions of the county. Most are highly accessible, and with access to the regional highway pattern and from Interstate 40; rail facilities are available in Marion and some northern portions of the county; however, the lack of such facilities south of Interstate Highway 40 limits growth in this area.

Rutherfordton-Spindale-Forest City

Industrial diversification has not occurred in Rutherford County. The local economy is dominated by textile manufacturing, with the furniture industry small by comparison. Nearly 12% of the employed residents must commute to other counties, primarily Cleveland, N. C., and Spartanburg, S.C. Efforts to diversify and provide more work opportunities for the underemployed male labor force are somewhat hindered by an intense rivalry between the three major towns - Rutherfordton, Spindale, and Forest City. Nevertheless, the existing base and the potential that exists for future growth are justification for establishing this area as a secondary growth center.

Future expansion is projected to occur in the tri-city corridor. Industrial sites are available with road accessibility and rail service. Sewer and water facilities and other urban services are available in most urban areas but lacking in rural areas.

The following tabulation presents the most recent census data for the sub-region.

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*/ Since many residents commute to jobs outside the county.

NORTH CAROLINA - SUB-REGION 45

ESTIMATED POPULATION 1966	
Total	82,900
Absolute Change 1960-1966	- 300
Percent Change 1960-1966	- 0.36

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	83,228	40,636	42,592	7,397	58,456	17,375
Percent Distribution	100.00	48.82	51.18	8.89	70.24	20.87
Percent Change 1950-1960	-0.57	-1.94	0.78	-74.75	75.72	-17.82

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	4,974	3,079	8,276	4,002	973	21,304
Percent Distribution	23.35	14.45	38.85	18.79	4.57	100.00
Percent Change 1950-1960	-50.14	-25.54	87.24	506.36	425.95	6.47

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	44,920	24,210	15,183	4,178
Percent Distribution	100.00	53.90	33.80	9.30
Percent Change 1950-1960	6.99	-7.40	40.78	32.42

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	29,608	1,695	19,657	797	9,951	898
Percent Distribution	94.59	5.41	96.10	3.90	91.72	8.28
Percent Change 1950-1960	0.29	57.38	-7.58	20.21	20.57	116.91

RATE OF UNEMPLOYMENT, 1962-65

1962	6.4
1963	6.7
1964	5.5
1965	3.8

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	31,308	27,507	20,459	7,654	10,849	19,853
Percent Distribution	53.23	46.77	72.77	27.23	35.34	64.66
Percent Change 1950-1960	2.27	1.34	-6.77	23.89	25.18	-5.30

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

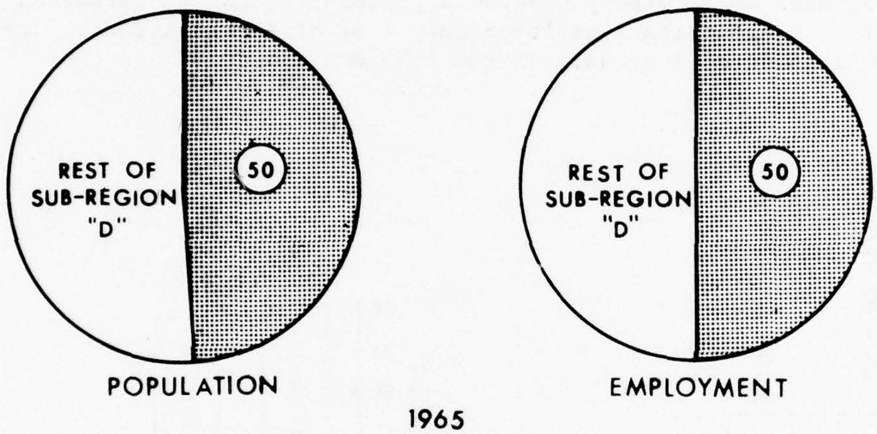
	1965 Number	Chng. 1962-65 No.	%
Tot. Work Force	31.5	1.9	6.4
Tot. Employment	30.3	2.6	9.4
Unemployment	1.2	-0.7	-38.7

NORTH CAROLINA - SUB-REGION 45

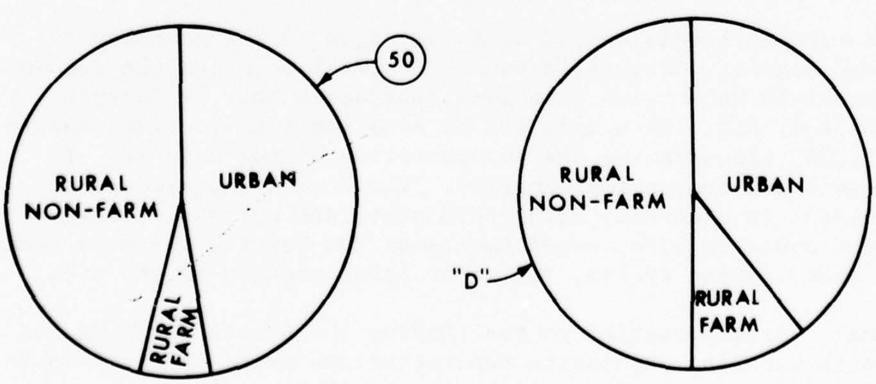
EMPLOYMENT

	1950	1960	Absolute Change
TOTAL ALL SECTORS	29,535	29,613	78
PRIMARY ACTIVITIES	5,637	1,804	- 3,833
Agriculture	5,576	1,735	- 3,841
Forestry & Fisheries	23	53	30
Mining	38	16	- 22
SECONDARY ACTIVITIES	14,357	16,378	2,021
Contract Construction	1,488	1,697	209
Food & Kindred Products	194	251	57
Textile Mill Products	9,373	11,078	1,705
Apparel	473	443	- 30
Lumber, Wood Products, Furniture	2,535	2,106	- 429
Printing & Publishing	87	81	- 6
Chemicals & Allied Products	20	32	12
Electrical & Other Machinery	29	90	61
Motor Vehicles & Equipment	2	8	6
Other Transportation Equipt.	1	78	77
Other & Miscellaneous	155	514	359
TERTIARY ACTIVITIES	9,131	10,709	1,578
Transportation & Communications	692	709	17
Utilities & Sanitary Service	274	328	54
Wholesale Trade	256	337	81
Retail Trade	3,097	3,759	662
Finance, Ins. & Real Estate	240	509	269
Personal Services	2,406	2,350	- 56
Professional Services	1,518	2,082	564
Recreational Services	148	100	- 48
Public Administration	488	530	42
Armed Forces	12	5	- 7
NOT REPORTED	410	722	312

State Planning Sub-Region 50 - The six-county South Carolina section of Water Sub-region D, one of the most rapidly developing areas of Appalachia, is the most industrialized region of the state. A textile-based economy has evolved to replace a historical dependence on primary agriculture and to foster large-scale urban growth. Primary development has been concentrated in four counties - Greenville, Spartanburg, Anderson, and Cherokee - and their central cities - Greenville, Spartanburg, Anderson, and Gaffney. The remaining two counties - Oconee and Pickens - although rural and mountainous in nature, have economic linkages with the major nodes, in addition to having shared somewhat in the area's growth; portions of each are designated as secondary growth centers.



Absolute population increases are common to the region. The estimated 1965 population, 616,500, is a 5% increase from the 1960 figure; the six-county areas grew by over 12% from 1950-60. Declines from 1950-60 were largest among rural farm population; growth occurred in urban and rural non-farm populations. In 1960, nearly 47% of area

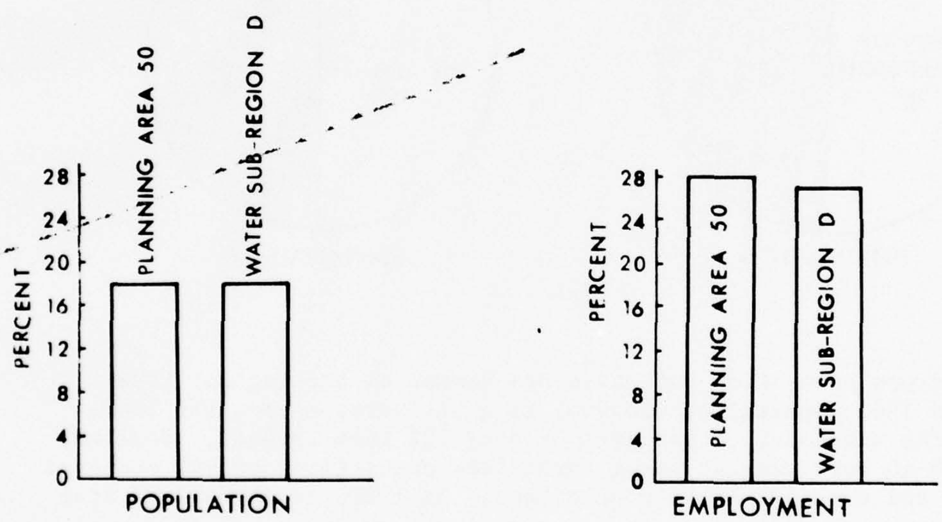


URBAN - RURAL
POPULATION DISTRIBUTION

population was urban, a 27% change from 1950; rural farm population decreased 68%.

Although absolute population increases occurred in all counties from 1950-60 and 1960-65, only Greenville exhibited a net gain from migration. Net losses from out-migration in Cherokee (17.6%), Oconee (15.2%), and Spartanburg (14.1%) from 1950-60 resulted in only minimal population gains.

Over one-third of all employed persons were employed in textile mill and apparel industries in 1960; textile-oriented and servicing industries, such as machinery production, accounted for an estimated additional 5%. Agriculture employed only 4.3% of the work force, reflecting a decline of over half of the 1950 employment.



CHANGES 1950-65

Median income levels exceed state averages in all counties but Cherokee and Oconee. Greenville County ($4,754) recorded the second highest income in Sub-region D in 1960, surpassed only by Forsyth (Winston-Salem), N.C. More than 69% of area families received incomes of over $3,000, illustrating the incorporation of the majority of residents into the regional prosperity. The area unemployment rate (3.8% in 1965) is generally below both state and national averages; however, the unstable labor requirements of the textile industry tend to create unemployment cycles, the major labor problem in the area.

The major transportation routes linking the Greater Atlanta and central North Carolina population concentrations extend through South Carolina Appalachia, affording all counties with external access; an

internal transport network is also established. Substantial impetus for development has been provided by Interstate Highway 85, which bisects the planning sub-region.

Growth centers for South Carolina Appalachia are defined as follows: (1) a primary growth corridor along Interstate 85, including Greenville, Spartanburg, and Greer, extended to the east to include Cowpens, to the west to includy Easley, north through Travelers Rest, and south through Simpsonville; (2) a primary center including Anderson City, and the corridor to and encompassing Belton; (3) the primary growth city of Gaffney; and (4) a secondary growth corridor from Seneca to Liberty.

Greenville-Spartanburg

The Greenville-Spartanburg corridor occupies a central position in the South Carolina Appalachian Region, south of the foothills of the southern Blue Ridge Physiographic Province on the Piedmont Plateau. The area is bisected east-to-west by Interstate 85, which connects to Asheville, Columbia and Charleston.

The major growth in Water Sub-region D focuses on the Greenville urban complex and comprises Greenville County and part of Pickens. Development in Greenville County has traditionally been heavily concentrated in textile and sewing industry lines. In recent years, a marked diversification has occurred, however, especially among textile-oriented and textile-supporting industries, and a fairly complex industrial mix is evolving: Greenville City, the major employment center, has supplemented textile and sewing industry with concentrations in textile machine production, synthetics, aircraft parts production, and agricultural products; Greer is developing a similar base, with the inclusion of gasoline generator and motor production.

Within Pickens County, development has been in southern areas. While textiles are the dominant employment sector, an important and sizable diversification has occurred. Easley, although the major economic center, is most dependent upon textiles, textile machinery and sewing industry.

The Greenville SMSA (Greevnille and Pickens Counties) the largest population concentration in the Sub-region with 280,000 people (estimated, July 1, 1965), has the largest absolute concentration of manufacturing employment. Manufacturing activities employ some 52,000 people, 41.3% of the labor force; textile mills and apparel operations account for over 62% of this figure, illustrative of the existence of a large, semi- and low-skilled labor force.

While projections indicate that development in Pickens will remain oriented to lower skill and wage industries, the employment character

of Greenville County is rapidly evolving away from traditional labor-intensive manufacturing. Employment forecasts*/ to the year 1990 indicate only a 29% increase - an absolute gain of 8,000 - in textile and apparel employment (with the largest portion of the increase in apparel). New line industrial activities - electrical machinery, chemicals, fabricated metals - and service industries are projected to increase much more rapidly, over 500 percent in relative terms and an absolute increase of over 20,000 jobs.

Labor is fairly tight in Greenville County, to the point of almost prohibiting large-scale employment increases; unemployment is generally found only among the unemployable. Surrounding counties are providing a significant and increasing proportion of the work force through commutation and in-migration. The male labor force is semi-skilled, but a highly skilled element is developing. Opportunities for unskilled labor are decreasing within the county. The female labor participation rate is significant in absolute terms, especially in textile and sewing industries. More sophisticated employment in the service sector attracts females from Greenville and its hinterland. Wages are substantially higher than in neighboring rural areas or in most of the Piedmont section, as a result of the demand for skilled workers in the increasingly sophisticated industrial base.

Large industrial sites are now a premium in the immediate Greenville City area. Future development must occur in either the northern portion of the county, or the southern, or in the extreme west-central area. A complete spectrum of services is now available to developing industry; prerequisites for future growth, however, are provision of adequate water supplies and elimination of an increasing pollution problem.

Developable areas are more extensive in southern Pickens. Provisions of basic services is limited to the Easley area, however.

Spartanburg County (estimated 1965 population, 162,300) is the second major development node in Appalachian South Carolina. Together with Cherokee County, Spartanburg forms the eastern portion of a developing urban concentration along the Interstate Highway 85 corridor.

Like other major centers in Sub-region D, Spartanburg has developed an intensive manufacturing industry. Over 32,000 persons, 42.8% of the civilian work force were engaged in manufacturing (1965), second only to Greenville in South Carolina; textile and apparel industries account for three-fourths of this employment. Spartanburg City has experienced a recent but significant diversification. Although the number of textile plants has increased, little employment increase in this sector has occurred in fifteen years; textile mechanization has proceeded rapidly in

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*/ Forecasts by Greenville County Planning Commission.

response to rapidly increasing wage rates. Major textile diversifications include man-made synthetic fibers, textile research, textile machinery, and plumbing fixtures. Satellite cities have additional textile firms, although smaller specialized manufacturing activities are also present. A semi-skilled labor force dominates the local scene, although an unskilled group exists. Work opportunities exist for all groups, and unemployment rates are low. Demand for skilled labor is developing more rapidly than the supply; attempts to cope with this situation are reflected in local programs emphasizing technical education.

Future growth in the Greenville-Spartanburg complex is expected to continue along the Interstate 85 corridor, between the two cities. The construction of a major regional airport and the establishment of industrial parks in the intermediate area are reflections of this trend. One major physical constraint to the future development is the provision of water for industry. Construction of Clinchfield Reservoir on the North Carolina-South Carolina border would assure adequate water quantity and quality required by the expansion of industry.

Forecasts of manufacturing employment have been made for Greenville County, and illustrate those growth activities for which local agencies are planning. Similar trends are expected for Spartanburg.

FORECASTS OF MANUFACTURING EMPLOYMENT, 1965-1990

Greenville County, S. C.

	Actual 1965	Forecast 1990	Incremental Increase, 1965-90 %	Absolute Increase, 1965-90
Major old-line:				
Textiles	19,500	21,600	11	2,100
Apparel	8,200	14,370	75	6,170
Food	1,900	3,930	107	2,030
Machinery	2,600	6,880	165	4,280
Subtotal	32,200	46,780	45	14,850
New-line:				
Electrical machinery	1,200	7,880	557	6,680
Chemicals	1,900	6,380	236	4,480
Paper products	1,100	2,690	144	1,590
Transportation Equipt.	300	2,990	897	2,690
Fabricated metals	320	3,390	959	3,070
Professional & Scientific	100	1,900	1,800	1,800
Subtotal	4,920	25,230	413	20,310

FORECASTS OF MANUFACTURING
EMPLOYMENT, 1965-1990 (Cont'd)

Greenville County, S. C.

	Actual 1965	Forecast 1990	Incremental Increase, 1965-90 %	Absolute Increase, 1965-90
Other industrial:				
Furniture	450	1,300	189	850
Stone, clay, glass	400	800	100	400
Lumber	150	400	167	250
Printing & Publishing	700	1,590	127	890
Miscellaneous	380	3,600	848	3,220
Subtotal	2,080	7,690	267	5,610
TOTAL	39,200	79,700	103	40,500

FROM: Dimension I85, A General Development Plan for Greenville County, South Carolina, Greenville County Planning Commission.

Anderson

The second major South Carolina development node is Anderson, which serves as an economic focus for western South Carolina. Although over-shadowed in importance and spatially limited in extent by the Greenville-Spartanburg complex, Anderson is, nevertheless, exerting an increasing influence upon surrounding areas.

Anderson, with a county population slightly in excess of 105,000 in 1965, is dependent upon labor-intensive, low skill-level manufacturing, in which textile and textile-associated activities dominate. An estimated 18,900 persons, 43.5% of the civilian work force, were engaged in manu-facturing; 76.7% of these workers were employed in textile and apparel operations. Minor but increasingly significant diversification has occurred in the production of chemical fibers, electrical machinery, and metal goods. As worker skill-levels rise, increased employment in these activities is projected.

Anderson has developed only minor and localized service, retail, and wholesale industries. The proximity of Atlanta and Greenville-Spartanburg precludes any intensive development in these sectors.

Bisected by an interstate highway connecting Atlanta, Greenville-Spartanburg, and Charlotte, Anderson County benefits through accessibility to the entire Peidmont; an extensive internal road network provides the framework for county-wide developmental possibilities.

Gaffney

In character, but not in degree, development in Gaffney has been similar to that in the other major South Carolina growth centers. The dominance of basic textile and sewing operations persists. Diversification such as has occurred in Greenville, Spartanburg, and Anderson has proceeded at a slower rate. The labor force remains unskilled, and wages are lower than those in contiguous areas.

The potential for development which exists is the major factor in the selection of Gaffney as a primary growth center. A central location between Charlotte and Greenville-Spartanburg on Interstate Highway 85 enhances the possibilities for growth. Land for development is available; access by rail and highway to many sites can be provided.

Liberty-Seneca

Development within Oconee and Pickens Counties has been centered in the Liberty-Seneca corridor because of the availability of urban services, accessibility, and the resident labor force. The lack of services has limited development in smaller communities to textiles and agricultural processing, with the exception of the production of electrical products in West Union.

Seneca, the most developed town, is strongly oriented toward textile, textile-linked, and sewing operations, although agriculture-oriented industries are also present. Liberty, similarly dependent on textiles and agriculture, is somewhat more diversified in relative employment terms. The growth of Clemson University has acted as a catalyst for the development of associated research activities.

Although little relative diversification is occurring, textile-oriented industries are increasing in both absolute and relative terms. It is not evident that a labor force exists with the skill level necessary to support more sophisticated activities. Although there is a high rate of female participation in the labor force, males still dominate in absolute numbers. The female workers are almost wholly concentrated in the sewing industry; males, in other lines of endeavor. Little in-commutation occurs, but some 10 percent of county residents commute out to other areas, principally Anderson, for employment. Thé majority of these are skilled male workers who find higher wages and better working conditions outside the county.

The area has relatively good accessibility for a rural county with no large central city. Interstate Highway 85 is a few miles below the southern border. A four-lane, controlled-access highway provides an eastern connection from Seneca to Easley in Pickens County. A thin, but complete, state road network connects most settled areas.

The following tabulation presents the most recent census data for the sub-region.

SOUTH CAROLINA - SUB-REGION 50

ESTIMATED POPULATION 1965	
Total	616,500
Absolute Change 1960- 1965	30,000
Percent Change 1960- 1965	5.12

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	586,521	286,272	300,249	40,188	267,645	278,688
Percent Distribution	100.00	48.81	51.19	6.85	45.63	47.52
Percent Change 1950-1960	12.09	11.58	12.58	-68.26	50.43	27.41

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	26,576	18,501	57,744	33,699	10,038	146,558
Percent Distribution	18.13	12.62	39.40	22.99	6.85	100.00
Percent Change 1950-1960	-45.31	-29.43	47.63	409.82	396.93	16.18

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total*	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	303,821	148,139	106,914	38,933
Percent Distribution	100.00	48.76	35.19	12.81
Percent Change 1950-1960	15.03	-2.15	51.19	37.16

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	229,599	8,570	142,782	4,562	86,817	4,008
Percent Distribution	96.40	3.60	96.90	3.10	95.59	4.41
Percent Change 1950-1960	12.88	13.72	4.70	-2.56	29.55	40.43

RATE OF UNEMPLOYMENT, 1962-65

1962	4.1
1963	5.3
1964	4.9
1965	3.8

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	241,926	165,135	151,070	44,057	90,856	121,078
Percent Distribution	59.43	40.57	77.42	22.58	42.87	57.13
Percent Change 1950-1960	14.58	5.56	6.95	22.12	29.99	0.60

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

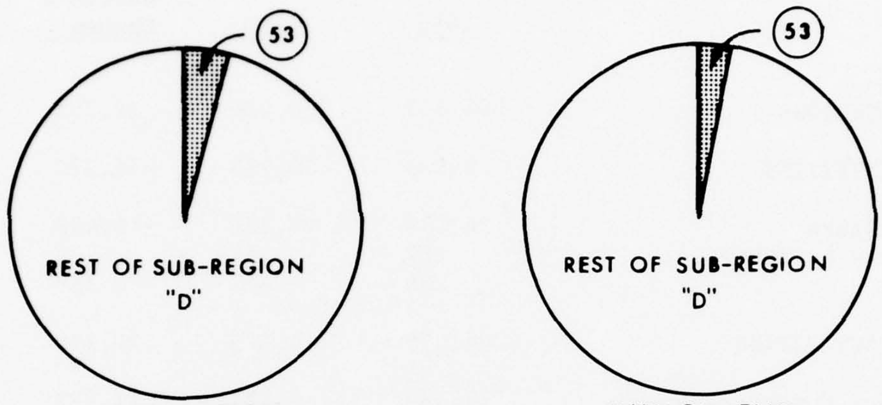
	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	271.0	41.8	18.2
Tot. Employment	260.7	40.9	18.6
Unemployment	10.3	0.9	9.6

SOUTH CAROLINA - SUB-REGION 50

EMPLOYMENT

	1950	1960	Absolute Change
TOTAL ALL SECTORS	203,613	233,356	29,743
PRIMARY ACTIVITIES	26,993	10,783	-16,210
Agriculture	26,648	10,221	-16,427
Forestry & Fisheries	87	161	74
Mining	258	401	143
SECONDARY ACTIVITIES	94,475	114,745	20,270
Contract Construction	12,189	14,171	1,982
Food & Kindred Products	2,455	3,544	1,089
Textile Mill Products	66,301	64,235	- 2,066
Apparel	4,487	13,810	9,323
Lumber, Wood Products, Furniture	3,288	2,489	- 799
Printing & Publishing	1,387	1,989	602
Chemicals & Allied Products	801	995	194
Electrical & Other Machinery	1,509	7,290	5,781
Motor Vehicles & Equipment	33	35	2
Other Transportation Equipt.	17	41	24
Other & Miscellaneous	2,008	6,146	4,138
TERTIARY ACTIVITIES	79,881	102,032	22,151
Transportation & Communications	6,806	6,393	- 413
Utilities & Sanitary Service	2,056	2,264	208
Wholesale Trade	4,129	5,629	1,500
Retail Trade	25,414	29,111	3,697
Finance, Ins. & Real Estate	3,748	6,292	2,544
Personal Services	19,631	22,190	2,559
Professional Services	13,306	20,830	7,524
Recreational Services	820	885	65
Public Administration	3,750	4,681	931
Armed Forces	221	3,757	3,536
NOT REPORTED	2,264	5,796	3,532

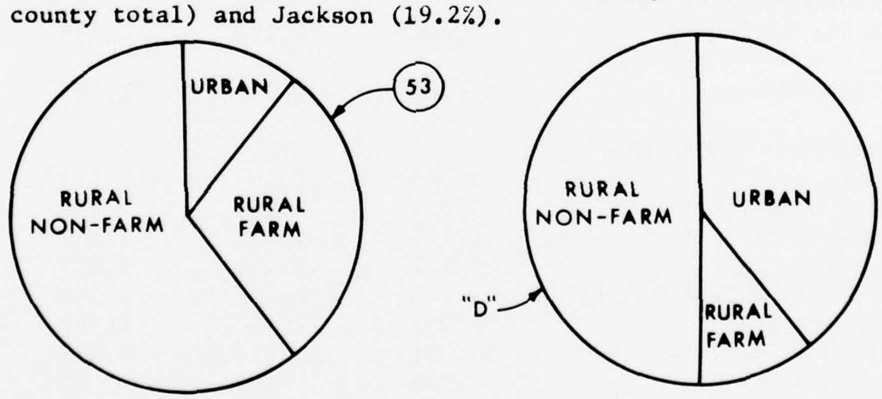
State Planning Sub-Region 53 - The three-county section of Georgia in Water Sub-region D is dissimilar from other counties in its development, both historical and current. The economic and physical composition is more characteristic of contiguous portions of Georgia in Water Area E-1 than the associated Carolina sections. It is carried in Water Sub-region D because its drainage is in the Savannah River Basin.



POPULATION EMPLOYMENT

1965

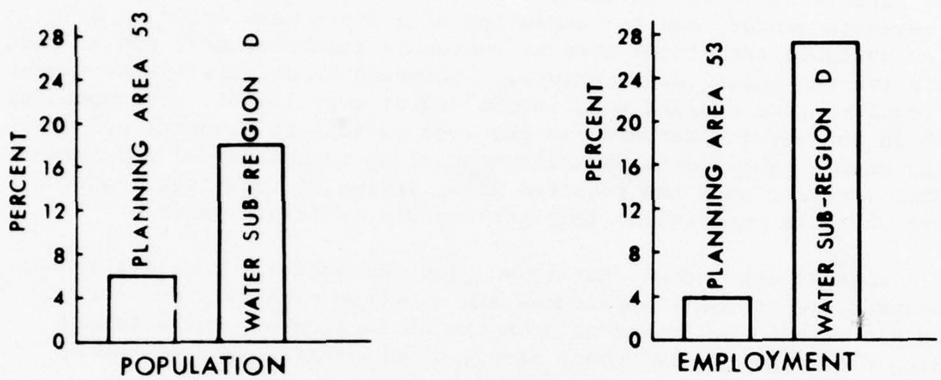
Barrow, Jackson, and Madison Counties, with an aggregate estimated population in 1966 of 46,000, are dominantly rural. Over 60% of the population is classed as rural non-farm, with an additional 20% categorized as rural farm. Rural farm population registered a 65% decrease from 1950 to 1960, however, with gains in rural non-farm (124%) and urban (14%). Urban concentrations are found only in Barrow (30.7% of the county total) and Jackson (19.2%).



URBAN-RURAL
POPULATION DISTRIBUTION

The declining importance of a cotton-based agricultural economy without corresponding growth in other economic sectors has resulted in an area characterized by low wages, high rates of unemployment, low standards of living, and a general lack of development. Soil depletion, bad farming practices, and increased costs of production have combined with the

emergence of new Southwestern and Pacific cotton regions to negate the natural advantages once held for cotton production by this section, as well as by other areas in Georgia. Until recent years, no effort had been made to seek activities to rebuild the economy. Agriculture remains a major employment sector with 13% of the total, surpassed only by apparel operatons (16.5%); manufacture of apparel combined with textile mill products accounts for 24.2% of area employment.



CHANGES 1950-65

The dominance of low-wage activities is relfected by median family income levels. Barrow ($3,675) and Jackson ($3,548) approach the Georgia average ($4,208); Madison ($2,708) registers the second lowest level in the Sub-region. Over 44% of the area families have annual incomes of less than $3,000.

Although 4.5% of the area population was unemployed in 1965, unemployment rates are decreasing. Some fluctuation is apparent, however, due to the unstable labor requirements of textile and apparel operations. While no realistic figure is available, disguised unemployment and underemployment, especially among farmers, is apparent.

Education levels are similarly low. The population of Barrow, Jackson and Madison Counties average 8.5, 7.9, and 7.8 years of education respectively, while the Georgia average is 9.0.

The growth stimulus for this tri-county section may prove to be Interstate 85 and the increased degree of accessibility it affords. The local road network has heretofore allowed ease of inter-area travel, but connections to outer areas have been poor. Interstate 85 has supplemented the road and rail net with high-speed access to the Piedmont, and to Atlanta in particular.

One secondary and two related growth centers has been designated for the Sub-region - Winder in Barrow County, and Commerce and Jefferson in Jackson County.

Athens, in non-Appalachian Clarke County, is considered an area of primary growth, due to the economic influence it exerts throughout the Sub-region. One of the most rapidly growing areas in Georgia, Athens is situated to the immediate south of the Sub-region and vies with Gainesville (Hall County) for the economic dominance of northeast Georgia.

The initial stimulus to growth in Athens resulted from the University of Georgia, the largest educational institution in the state. In recent years, large-scale state investment in the University, the establishment of a research center, and the evolution of a light manufacturing base have established the Athens area as a dynamic growth center, one of both qualitative and quantitative growth. Increases in university enrollment have resulted in a student body in 1967-68 of over 16,000; corresponding growth in the service sectors has occurred to support students and university staff. The recent establishment of an environmental and agricultural research park has resulted in an influx of technical research workers which is expected to increase sizably in future years.

Industrial development has taken place exclusively in light industry; the manufacture of small appliances and electric machinery dominates. Future growth will be dependent upon the correction of severe annual flooding along the Middle Oconee River, which passes through Athens.

Athens exerts a considerable influence on surrounding counties; this dominance is greater in non-Appalachian areas than to Appalachian areas in the north, because of their nearness to Gainesville. Nevertheless, the southern halves of Barrow, Jackson, and Madison Counties, including the towns of Commerce and Jefferson in Jackson County, and Danielsville in Madison County, are economically oriented to Athens and Clarke County.

Winder

Winder, a secondary growth center of the Sub-region, has developed the most diverse economic base of all towns in the 3-county area. Textile industries have been supplemented by such sectors as aircraft engine assembly to provide skilled and high-wage-paying work opportunities. Winder is also developing a minor but regionally significant financial and service industry and should continue to be the major employment center for white-collar workers.

Basic services necessary for area growth are available in Winder, but are currently lacking in peripheral county areas. No physical retardants to growth are evident.

Commerce and Jefferson

A smaller and less diverse but rapidly expanding complex is evolving in Jackson County, centered in Jefferson and Commerce, where textile and apparel industries predominate. Future growth of this area is dependent upon the provision of an increased water supply, as annual water shortages now inhibit individual expansion. The proposed Curry Creek Reservoir would correct this situation.

The following tabulation presents the most recent census data for the sub-region.

GEORGIA - SUB-REGION 53

ESTIMATED POPULATION 1966	
Total	[illegible]6,070
Absolute Change 1960-1966	[illegible],070
Percent Change 1960-1966	1.8

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	44,230	21,572	22,658	8,573	26,551	9,106
Percent Distribution	100.00	48.77	51.23	19.38	60.03	20.59
Percent Change 1950-1960	-0.27	-1.28	0.71	-65.12	124.67	14.47

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	3,179	1,943	4,108	1,655	483	11,368
Percent Distribution	27.96	17.09	36.14	14.56	4.25	100.00
Percent Change 1950-1960	-55.91	6.17	200.95	707.32	1,280.00	2.88

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	22,835	13,626	7,546	1,794
Percent Distribution	100.00	57.52	31.85	7.57
Percent Change 1950-1960	51.49	-11.12	56.72	29.06

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	[illegible],969	528	10,599	355	6,370	173
Percent Distribution	[illegible]6.98	3.02	96.76	3.24	97.36	2.64
Percent Change 1950-1960	1.90	31.02	-11.10	46.69	34.67	7.45

RATE OF UNEMPLOYMENT, 1962-65

1962	6.0
1963	6.3
1964	5.8
1965	4.5

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	1[illegible],518	13,626	10,975	3,787	6,543	9,839
Percent Distribution	56.25	43.75	74.35	25.65	39.94	60.06
Percent Change 1950-1960	2.64	-0.56	-9.83	39.59	33.64	-10.47

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	%
Tot. Work Force	15.1	0	0
Tot. Employment	14.4	0.2	1.4
Unemployment	0.7	-0.2	-22.2

GEORGIA - SUB-REGION 53

EMPLOYMENT

	1950	1960	Absolute Change
TOTAL ALL SECTORS	16,664	16,990	326
PRIMARY ACTIVITIES	6,328	2,363	- 3,965
Agriculture	6,281	2,328	- 3,953
Forestry & Fisheries	2	23	21
Mining	45	12	- 33
SECONDARY ACTIVITIES	5,415	7,808	2,393
Contract Construction	755	1,273	518
Food & Kindred Products	172	717	545
Textile Mill Products	1,364	1,312	- 52
Apparel	2,282	2,871	589
Lumber, Wood Products, Furniture	598	442	- 156
Printing & Publishing	35	21	- 14
Chemicals & Allied Products	38	31	- 7
Electrical & Other Machinery	35	404	369
Motor Vehicles & Equipment	24	137	113
Other Transportation Equipt.	-	48	48
Other & Miscellaneous	112	552	440
TERTIARY ACTIVITIES	4,590	6,537	1,947
Transportation & Communi-cations	352	469	117
Utilities & Sanitary Service	141	191	50
Wholesale Trade	229	353	124
Retail Trade	1,444	2,033	589
Finance, Ins. & Real Estate	131	300	169
Personal Services	1,282	1,699	417
Professional Services	637	1,023	386
Recreational Services	62	20	- 42
Public Administration	300	428	128
Armed Forces	12	21	9
NOT REPORTED	331	282	- 49

DEVELOPMENT
OF
WATER RESOURCES
IN
APPALACHIA

MAIN REPORT
PART II
SHAPING A PLAN

CHAPTER 8 - SHAPING THE PLAN FOR SUB-REGION D

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CHAPTER 8 - SHAPING THE PLAN FOR SUB-REGION D

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CHAPTER 8 - SHAPING THE PLAN FOR SUB-REGION D

SECTION I - FUTURE GROWTH PATTERN

1. WATER SUB-REGION

The Office of Business Economics prepared projections of the future levels of employment (by sector) and population for economic Sub-regions 15, 19, 23 and 24. (See delineation shown in Figure 8-1.) A more detailed presentation of those data is in Appendix E. These projections, reaggregated into Water Areas D-1 and D-2, are shown in the following tabulation:

	Years			
	1960	1980	2000	2020
D-1:				
Population	573,382	792,000	1,155,000	1,622,000
Employment	217,132	334,000	476,000	654,000
D-2:				
Population	630,726	927,000	1,306,000	1,870,000
Employment	250,346	365,000	514,000	726,000
D-Total:				
Population	1,204,108	1,719,000	2,461,000	3,492,000
Employment	467,478	699,000	990,000	1,380,000

These projections reflect the present rapid growth rate of the area and demonstrate that the Water Sub-region is expected to grow at a rate in excess of the national average (See Appendix E for complete statistics).

However, if net migration rates are to be reduced to zero, and if sub-region incomes are to be raised to rough comparability with those of the nation, the rate of growth in employment will have to be accelerated. Therefore, developmental benchmarks for Water Sub-region D, reflecting a growth rate higher than historical projections indicated, have been established (See Figure 8-2). These developmental benchmark objectives are the result of an analysis of the growth potential of the Water Sub-region, and were prepared to reflect the contribution that the Water Sub-region can make to the overall objectives of the Appalachian program. The water resources program for the Water Sub-region is being planned and analyzed within the objectives set in the developmental benchmarks. These developmental benchmark growth objectives are as follows:

	1980	2000	2020
	Years		
D-1:			
Population	796,000	1,334,000	2,106,000
Employment	348,000	519,000	816,000
D-2:			
Population	930,000	1,494,000	2,325,000
Employment	365,000	581,000	901,000
D-Total:			
Population	1,726,000	2,828,000	4,431,000
Employment	713,000	1,100,000	1,717,000

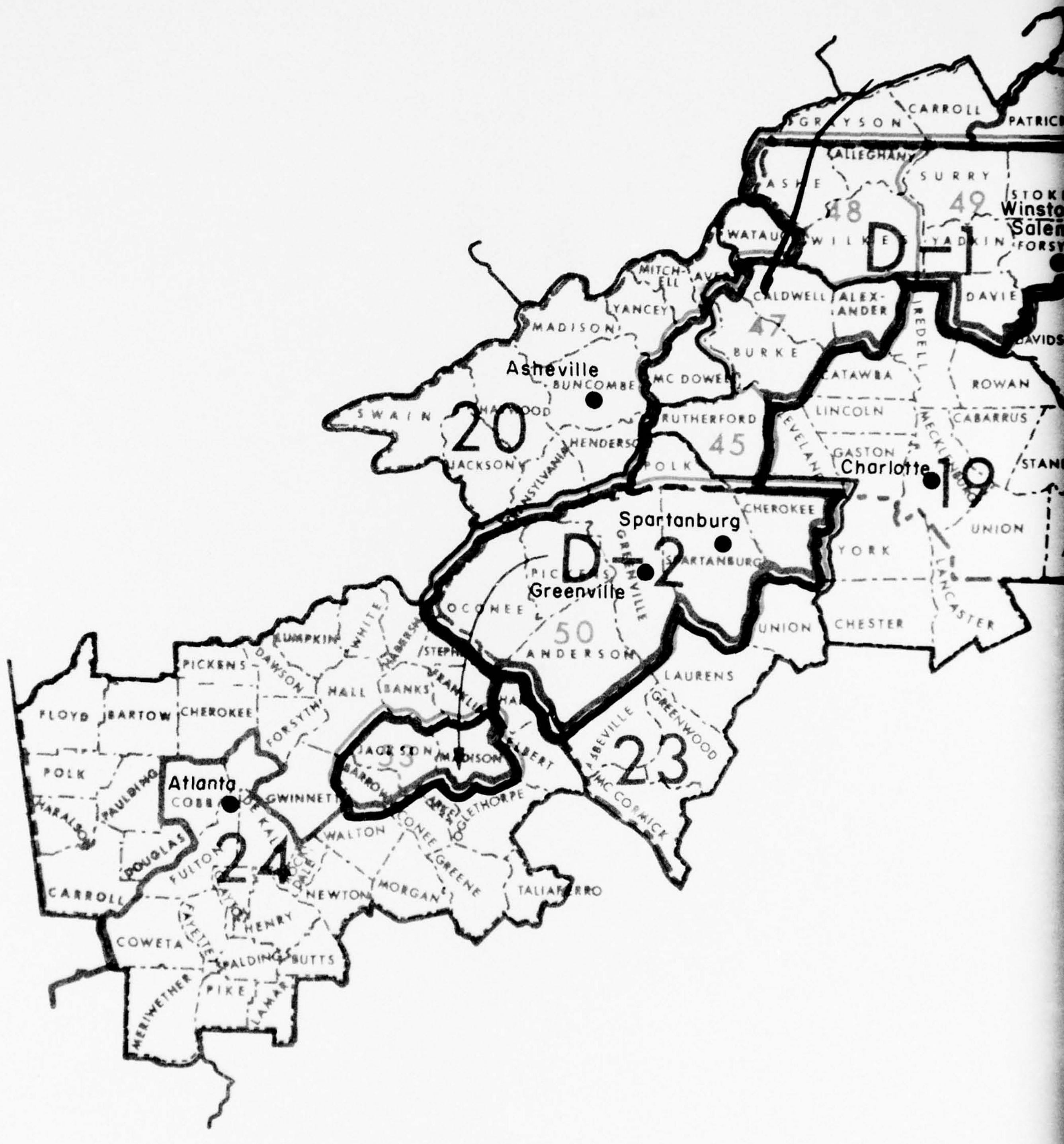
2. STATE PLANNING SUB-REGIONS

Water Sub-region D is also divided into State Planning Sub-regions 45, 47, 48, 49, 50 and 53. This sub-regionalization was prepared by the states involved. The developmental benchmark objectives have been dis-aggregated on this set of boundaries and are as follows:

State Planning Sub-region:		Years			
		1960	1980	2000	2020
45:	Population	83,228	115,000	185,000	287,000
	Employment	29,613	50,000	72,000	111,000
47:	Population	117,878	152,000	253,000	354,000
	Employment	44,863	66,000	98,000	137,000
48:	Population	72,771	114,000	197,000	318,000
	Employment	23,707	50,000	77,000	118,000
49:	Population	299,479	415,000	699,000	1,147,000
	Employment	118,949	182,000	272,000	450,000
50:	Population	586,521	872,000	1,426,000	2,241,000
	Employment	233,356	343,000	555,000	868,000
53:	Population	44,230	55,000	68,000	84,000
	Employment	16,990	22,000	26,000	33,000

3. DEVELOPMENTAL CONSTRAINTS

The tone of the preceding economic profiles and prospects indicate that developmental constraints in Sub-region D are not as formidable and complex as the ones facing some other parts of Appalachia. The rather tight labor market is indicative of the pace at which economic development is occurring. Shifts in employment mix affect the demand for labor to the



D-1
D-2
19
20
23
24
Winston Salem
Asheville
Charlotte
Spartanburg
Greenville
Atlanta
GRAYSON
CARROLL
PATRICK
ALLEGHANY
SURRY
ASHE
48
49
WATAUGA
WILKES
YADKIN
FORSYTH
MITCH-ELL
YANCEY
MADISON
CALDWELL
ALEX-ANDER
47
BURKE
DAVIE
IREDELL
DAVIDSON
BUNCOMBE
MC DOWELL
CATAWBA
ROWAN
SWAIN
HAYWOOD
RUTHERFORD
LINCOLN
CABARRUS
HENDERSON
45
GASTON
JACKSON
POLK
CHEROKEE
UNION
SPARTANBURG
YORK
PICKENS
GREENVILLE
OCONEE
50
ANDERSON
UNION
CHESTER
LANCASTER
LUMPKIN
WHITE
PICKENS
DAWSON
HALL
BANKS
LAURENS
FLOYD
BARTOW
CHEROKEE
FORSYTH
GREENWOOD
JACKSON
MADISON
ELBERT
ABBEVILLE
POLK
PAULDING
COBB
GWINNETT
MC CORMICK
HARALSON
DOUGLAS
WALTON
OGLETHORPE
FULTON
CONEE
GREENE
CARROLL
NEWTON
MORGAN
TALIAFERRO
HENRY
COWETA
FAYETTE
SPALDING
BUTTS
MERIWETHER
PIKE
LAMAR

LEGEND

APPALACHIAN REGIONAL BOUNDARY

WATER SUB-REGION D BOUNDARY

D-1 WATER SUB-AREA BOUNDARY

19 ECONOMIC SUB-REGIONS

48 STATE PLANNING SUB-REGIONS

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IN
APPALACHIA

WATER SUB-REGION D

PLANNING AREAS

OFFICE OF APPALACHIAN STUDIES   JUNE 1968

II-8-3   FIGURE 8-1

2

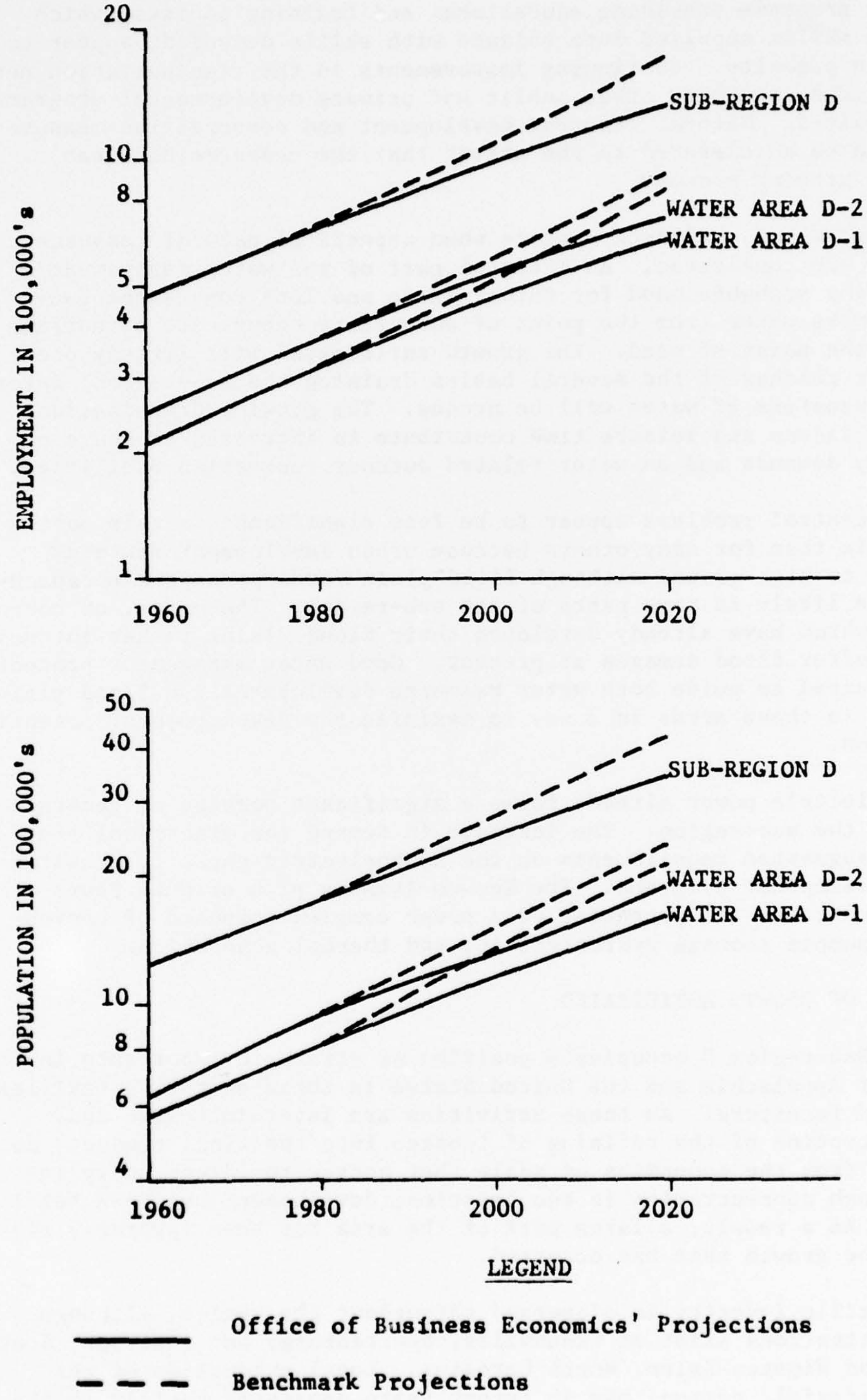

FIGURE 8-2 PROJECTIONS OF EMPLOYMENT AND POPULATION
SUB-REGION D

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extent that programs providing educational and training courses, which would bring skills supplied into balance with skills demanded, appear to rank high in priority. Continuing improvements in the transportation net, health services, and many other public and private developmental programs will be required. Natural resource development and conservation measures will need to be accelerated to the extent that the resource base can support the growing economy.

A rather clear challenge appears when aspects of natural resource development are considered. An integral part of the water management program is the probable need for rather large and long conveyance facilities to move water from the point of subsurface occurrence or surface storage to the point of need. The growth anticipated will largely occur on the upper reaches of the several basins draining the sub-region, intertributary transfers of water will be needed. The growing urbanization, population, income and leisure time contribute to increased pressure on water supply demands and on water related outdoor recreation facilities.

Flood control problems appear to be less significant in this part of Appalachia than for many others because urban development patterns have tended to high ground although flood plain development and encroachment will be likely in some parts of the sub-region. There are, of course, some areas which have already developed their flood plains rather intensively and which suffer flood damages at present. Good water management protection will be required to guide both water resource development and flood plain development in these areas in a way to maximize the developmental potential of the region.

Hydroelectric power already forms a significant portion of generation capacity in the sub-region. The increase in demand for electrical energy will place augmented requirements on the hydroelectric capacity of water resource development programs. The Keowee-Toxaway plan of Duke Power Company illustrates the potential of a power complex composed of conventional and pumped storage hydroelectric, and thermal generation.

4. PATTERN OF GROWTH ANTICIPATED

Water Sub-region D occupies a position of strategic importance in the economies of Appalachia and the United States in three sectors - textiles, tobacco, and furniture. As these activities are labor-intensive and, with the exception of the refining of tobacco into the final product, do not benefit from the economies of scale that accrue to larger heavy industry through concentration in one location, development has been fairly dispersed. As a result, a large part of the area has been favorably affected by the growth that has occurred.

The textile industry is dispersed throughout the region, although large concentrations exist at Greenville, Spartanburg, and Anderson, South Carolina; and Winston-Salem, North Carolina. Local production of the major raw material, cotton, has in recent years decreased rapidly to the extent where, today, the southeast is not the dominant supplier, a position it formerly held. Absolute losses in employment and income resulting from the decline in importance of the cotton crop have been offset by the increase in textile mill and textile-associated operations. The area of

greatest textile activity in the nation is the South Carolina Appalachian area, where some 115 plants are located although the production of broad woven fabrics is of secondary importance. Georgia mills tend to specialize in tufted carpet products and broad weaves.

Piedmont textile mills are generally more productive than operations in other areas for one major reason. Most mills are new, having the latest, most automated, and most productive equipment; fewer workers are needed to achieve similar output levels than in operations elsewhere. Approximately 60% of the nation's broad-woven cotton mills are in Sub-region D; these mills account for over 75% of the broad-woven cotton products. Similar producing levels are found in the other textile operations which include broad-woven synthetics and seamless hoisery.

In 1960, more than 104,000 persons were employed in textile trades in Sub-region D, 19.8% of the Appalachian and 10.5% of the U.S. totals. Projections prepared by the Office of Business Economics indicate that growth in the textiles industry will continue. A total employment in 2020 of 172,000 persons, an absolute increase of 68,000 from 1960, is estimated for the sub-region; this 2020 figure, approximately 24.8% of the Appalachian and 18.7% of the national projected textile employment, suggests that the relative importance of textiles will decline within the sub-region, but increase with respect to Appalachia and the United States.

Despite the absolute gains, textile employment will occupy a decreasing relative position in the region with regards to both the total and manufacturing employment. Textile employment relative to total employment in water Sub-region D is projected by OBE to decrease to 12.5% in 2020, from the 1960 level of 22.3%; its relationship to all manufacturing employment will also decrease, from 52.3% to 32.0%. Given a successful Appalachian program, these 2020 figures would be further decreased - 10.5% of total employment and 27.0% of manufacturing workers would be in the textile industries.

Assuming the developmental benchmarks will be achieved, large-scale growth will continue in the above mentioned centers. Greenville should continue as the major textile center; local estimates, for example, indicate increases in textile employment in the 25-year period, 1965-1990, of 11%, or 2100 workers. Similar estimates are advanced for other cities. If current trends persist, the more sophisticated textile operations, which are not so dependent upon large and unskilled labor supplies, will continue to locate in the major cities; the more basic operations will locate in smaller cities and utilize the cheaper and lesser-skilled workers. It is expected that the greatest employment increases will continue to be in the smaller towns and urban periphery, particularly in South Carolina and State Planning Areas 45 and 47 of North Carolina. The technically advanced operations, with the highest outputs, will tend to cluster in Greenville, Spartanburg, Anderson, Gaffney and Winston-Salem.

With the growth of basic textile operations, activities linked to them are also expected to increase. Machine tool and textile machinery industries are developing, and should mature into non-textile machinery

fields. Development in these sectors is almost totally in Greenville, Spartanburg, and Anderson.

The tobacco industry of the sub-region, while not so widespread as textiles, is vital to the economy. Almost one-tenth of the population of Water Area D-1 is directly or indirectly involved in some stage of production of tobacco products. Over thirty percent of all tobacco goods domestically produced are from this area. While the industrial refining processes are concentrated in Winston-Salem, large portions of Water Area D-1 are involved in producing the tobacco. Consequently there is an almost total vertical integration of the tobacco industry in this area. Growth in this industry is expected; with the exception of the primary activity of growing tobacco, major development should occur only in the Winston-Salem area.

The final major economic sector is that of furniture production. The furniture industry is not so dominant nor widespread as textiles. However, for the central portion of Area D-1, as well as contiguous parts of Area J-2 and non-Appalachian counties to the southeast, furniture production is the primary employer. Approximately ten percent of the total national furniture production occurs here. Projections indicate that this sector of the economy should continue to grow as consumer spending increases. Such growth should be felt in the sub-region, because of the existing competitive advantage for furniture production. This labor-intensive activity is concentrated in Caldwell and Burke Counties; growth should continue here, and is expected to disperse into contiguous counties to absorb resident labor supplies.

Employment in food processing activities, which totaled 7,900 in 1960, is concentrated in the large cities. Benchmark projections to 2020 indicate an anticipated employment of 22,000. The greatest absolute concentration will persist in the area cities; however, food processing will have significant relative importance in smaller towns, such as Wilkesboro-North Wilkesboro, North Carolina.

Benchmarks for other major water-using industries - specifically paper, chemicals, petroleum, and primary metals - are not large, in comparison to the previously mentioned activities. However, various local projections indicate that the developmental benchmarks may be too conservative in some sectors and growth may occur that is not now projected. Greenville County, South Carolina, is a specific case, where local estimates for 1990 indicate an employment in chemicals of 6380 persons, a total in excess of the benchmarks for the year 2020, 30 years later. Similar instances with regard to paper and metals production can also be cited.

It may be forecast, then, that the dynamic nature of the economies of Greenville, Spartanburg, Winston-Salem, and Anderson may place higher than expected demands on the resource base, particuarly water.

5. ADDITIONAL CENTERS HAVING POTENTIAL FOR GROWTH

Potential development centers exist in Georgia at Jefferson and Commerce, should local water shortage and flooding problems be corrected. In addition, non-Appalachian Athens could exert an increasing economic influence on this three-county area, with the alleviation of a flooding problem, which is centered in Sub-region 53.

Within South Carolina, no other potential centers are envisioned. However, the degrees of development and usage of resources, particularly water, and correction of physical problems, specifically pollution, may have profound effect upon development in Columbia and other non-Appalachian areas to the south, situated in the same drainage basins.

Centers in North Carolina where future growth may occur exist at Elkin-Jonesville and Columbus-Tryon. Flooding and a shortage of land at Elkin-Jonesville tends to restrict growth now. A physical isolation, which should be eliminated by the construction of Interstate 26, exists at Columbus and Tryon.

SECTION II - WATER RELATED NEEDS

6. INTRODUCTION

The analysis of water needs in the context of the developmental objectives of PL 89-4 is based on several considerations. These include:

1. Immediate needs;

2. The needs that result from the continued development of the sub-region and contiguous areas, with a normal water development program;

3. The needs that will result from accelerated development that is generic to development of an economy within the full capacity of the area to supply industrial sites, provide labor, developmental capital, and other needs.

The latter aspect has been approached by the setting of the benchmarks for population, employment, and income. These higher planning goals reflect potential more than historical trends.

From the socio-economic analysis of the region and the overlay of the benchmark projections a judgment of the developmental impediments associated with water resource management has evolved. The procedure used to make this judgment was to spatially locate the benchmark projection in the sub-region. This process is by the way of successive disaggregation of the projections from larger to smaller areas. Of course, error limits increase as the process narrows the projections to smaller areas. This is an inherent risk associated with long-range planning, but the validity

of the analysis can be improved by design of greater flexibility into project recommendations and by hedging future needs by the way of staged construction.

Water resources planning is dominated by the hydrologic delimitation of space. Since water can be reused many times on its way to the sea or back to the atmosphere, the regions delimited for economic analysis were overlain on watersheds for the derivation of water needs. Benchmark projections were allocated (by the disaggregation procedures) to state planning sub-regions thence to river basins. If the analysis indicates a new set of water problems or water related impediments to the attainment of the developing region to its potential, these problems or impediments become the needs against which water management proposals would be designed.

7. WATER RESOURCE NEEDS IN THE SUB-REGION

The Problems in General

The relevant water and related land resource needs of the sub-region are primarily concerned with flood control, land conservation and development, water supply, maintenance of stream quality, power, and recreation. Other needs related to irrigation, drainage, and sedimentation control exist and will continue, but are expected to be adequately considered in planning for other water-use projects, and so should not be inhibiting factors to the economic growth and development of the sub-region. The term "needs" is used in this section in a specialized sense. It refers to projected demands less the supply that will be available by virtue of present development plus additional installations expected through 1980. In this section estimates will be made for the sub-region as a whole to establish a frame of reference, and estimated needs, insofar as they can be localized, will be indicated for each growth center.

Flood Control

Compared with similarly-sized areas elsewhere in Appalachia, Sub-region D appears less subject to flood damage. At present (1967) values total annual flood damages in the sub-region are estimated at $2,608,000, and inclusion of some small, unevaluated stream reaches is not likely to raise this above $3,500,000. Rural damages ($1,750,000) are about 67 percent of this total; urban and structural damages, including railroads, bridges, etc., account for the other 33 percent. Considering those projects proposed under authorities other than the Appalachian water resources program and that are likely to be constructed prior to 1980, damage reduction estimates of $1,050,000 can be expected. This would leave residual flood damages between $1.6 million and $2.45 million to be mitgated (partially) by additional projects. Estimates of residual damages by growth centers is presented in Table 8-1. It is estimated that, without flood control improvements, total annual flood damages would be between $4.2 and $5.6 million in 2020. However, with the works considered in this plan, and with adequate flood plain management practices followed to minimize flooding damages, residual damages can be held to acceptable levels.

TABLE 8-1
FLOOD CONTROL NEEDS & RESIDUAL DAMAGES BY GROWTH CENTER
WATER SUB-REGION D ($1,000)

Item	Stream	Estimated Annual Damages - 1968	Reduction by Projects to be in Place by 1980	Residual Needs	Reduction by Alternatives Studied for AWRS	Residual Damages	Effective Projects: Programmed by 1980	Effective Projects: Additional Projects
NORTH CAROLINA								
Yadkin River Basin								
Wilkesboro-N.Wilkesboro	Yadkin R., Reddies R.	140	139	1	-	1	Reddies (139)	
Elkin-Jonesville	Yadkin River	89	35	54	24	30	Reddies (35)	Roaring R. (24)
Mt. Airy	Stewarts-Lovill Crks.	55	44	11	-	11	Stewarts-Lovill Crk. WS (USDA), (44)	
Winston-Salem	Muddy Creek	20	0	20	-	20		
Catawba River Basin								
Lenoir		Negl.						
Morganton		Undefined						
Marion		Negl.						
Broad River Basin								
Rutherfordton-Forest City-Spindale	Cleghorn Creek, Second Broad River	5	0	5	-	5		
SOUTH CAROLINA								
Santee River Basin								
Gaffney	Thicketty & Cherokee Creeks	50	38	12	4	8	Thicketty Creek WS (38)	Cherokee Creek WS (USDA), (4)
Easley-Greenville-Spartanburg	Reedy R., George's Ck., S.Pacolet R., N.& Middle Tyger R.	380	304	76	39	37	George's Ck. WS (USDA), (11), Reedy R. LPP, (293)	S.Pacolet R.WS(USDA) (13.7); N.& Middle Tyger R. WS (USDA) (25.6)
Savannah River Basin								
Seneca-Central-Liberty	Eighteen Mile Creek	26	0	26	21	5		Eighteen Mile Crk.WS (USDA), (21)
Anderson-Belton	Wilson Creek	11	10	1	-	1	Wilson Creek WS (10)	
GEORGIA								
Oconee River Basin								
Commerce		Negl.						
Winder		Negl.						
Jefferson	Middle Oconee River Walnut Creek	82	78	4	-	4	Middle Oconee-Walnut Crk. WS (USDA), (78)	
Athens	N.& Middle Oconee	108	17	91	80	11	Little Sandy & Trails Crk.WS (USDA), (17)	Curry Crk.Res. (80)
TOTAL GROWTH CENTERS		966	665	301	168	133		

Most of the towns of the sub-region are located on divides and therefore relatively free from floods. There are noticeable exceptions in the Upper Yadkin Basin at Wilkesboro, North Wilkesboro, Elkin and Jonesville where the combination of less favorable upland topography and fairly wide flood plain have led to relatively heavy development of the flood plain. Future economic developments will undoubtedly increase the pressure for further urban development of such flood plains. Several centers, however, have small creeks going through urbanized areas that cause occasional local flooding, and receive wastes with attendant low flow nuisances. Reedy Creek in Greenville and Muddy Creek in Winston-Salem are obvious examples. An estimate of urban land requirements in the flood plains and outside by growth centers is given in Table 8-2.

The U.S. Department of Agriculture's 1967 Conservation Needs Inventory for Watersheds shows that floodwater and sediment damages, occurring in upstream areas and requiring project action, total an estimated $380,400 annually. Only about five percent occurs in small built-up areas.

Watershed Land Management

The problems and needs with respect to proper watershed land management are those associated with needed changes in present land use and the application of needed conservation treatment for its proper use.

The principal conservation problems for cropland are erosion and drainage. By 1980 about 767,300 acres will need treatment to control erosion. Drainage of excess water from approximately 120,500 additional acres will be required.

Pasture land treatment needs by 1980 include new seeding of about 331,400 acres and improvement of existing vegetative cover on another 133,600 acres. Protection of vegetative cover from overgrazing and invasion by undesirable plants is needed for an estimated 168,900 acres.

Some of the conservation needs for forest and woodland by 1980 include establishment or improvement of a timber stand on 1,703,700 acres, proper harvesting on 591,200 acres, and protection of 315,300 acres from grazing by domestic livestock. As suggested by USDA in Appendix A, to attain satisfactory watershed management on forest lands presently in public ownership, small private inholdings should be acquired by state, federal, or other governmental units where development and management will not otherwise be accomplished.

Other conservation needs by 1980 include converting about 210,000 acres of cropland to less intensive use, such as pasture, woodland, wildlife and other, and stabilization of about 8,000 acres of eroding roadbanks on public rights-of-way.

It is expected that by 1980 the following land use acreage will be needed to support planned and expected development:

TABLE 8-2
LAND DEVELOPMENT NEEDS AND ALTERNATIVES BY GROWTH CENTER
WATER SUB-REGION D

	Urban Land Needs[a/]		Area Protected to a Minimum of 100 Year Recurrence Interval			
	Total Acres	Flood Plain Acres	Reddies	Roaring	Clinchfield	Curry Creek
NORTH CAROLINA						
Wilkesboro-North Wilkesboro	1,840	300	300[e/]			
Elkin-Jonesville	1,560	146[d/]		30[d/]		
Mt. Airy[b/]	6,200	790				
Winston-Salem	57,700	580				
Lenoir	4,840	260				
Morganton	6,630	370				
Marion	4,050	200				
Rutherfordton-Spindale-Forest City	5,275	290			c/	
SOUTH CAROLINA						
Gaffney	3,145	60				
Easley-Spartanburg-Greenville	78,000	1,560				
Seneca-Central-Liberty	5,740	30				
Anderson-Belton	14,200	60				
GEORGIA						
Commerce	1,213	60				
Winder	2,440	80				
Jefferson	909	60				
Athens	9,565	510				315
TOTAL	203,307	5,440				

a/ Over 1960 land use
b/ Stewarts-Lovill Creek Watershed partially protects some of the flood plain areas in urban development.
c/ Topography around the reservoir allows development of industrial, commercial, and residential property.
d/ Eighty-four acres additional area would be provided by flood protection from W. Kerr Scott and Reddies Reservoirs.
e/ Gain is due to system including W. Kerr Scott Reservoir.

Land Use	Land Use 1958	Acres Needed by 1980
Cropland	1,563,300	1,353,000
Pasture	644,400	743,000
Forest and Woodland:		
State and Private	3,685,800	3,699,200
National Forests	235,300	242,200
Other Land	375,700	339,700
Nonagricultural	323,200	450,600
Total	6,827,700	6,827,700

The demand for land for industrial, commercial, and urban residential site development in the sub-region is projected to be 56,900, 125,400, and 183,700 acres during each of the 20-year periods 1960-80, 1980-2000, and 2000-20, respectively. This totals about 365,000 acres, or a doubling of the present area in urban use. These acreages are based on population and employment projections (Benchmarks, see Section I this Chapter) and allow 24 workers per acre for manufacturing, 10 per acre for transportation, 30 per acre for trades, and 150 per acre for services. Residential land needs are based on 15 persons per acre. Analysis indicates sufficient land of suitable gradient and location will be available for this scale of development.

Water Supply

Current and projected water supply "demand" estimates for Sub-region D are given in Table 8-3. Water supply "needs" (the increment of "demand" over the available 1980 supply) are given in Table 8-3 and portrayed graphically in Figure 8-3.

Table 8-3 shows that the estimated daily demand on municipal water supply systems, in 1960, was about 85 mgd, and the total manufacturing intake (which was reused once) was about 143 mgd, with about 31 mgd of this being furnished by municipal water supply systems. In the year 2020 it is estimated that total daily demands on municipal water supply systems in Sub-Region D will be about 805 mgd, and the total manufacturing use, assuming one-reuse, will be about 1,115 mgd, with about 212 mgd of this being a part of the total 805 mgd municipal water system demand. While this will require a somewhat higher degree of runoff regulation, the annual runoff of the area, being on the order of 10,000 mgd, would easily permit such usage. Estimated water supply needs by growth center (presented in Table 8-11), and subsequent tables vary from those estimated by FWPCA in Appendix D. Several factors affect the assumptions underlying the differences in estimates of needs, including the degree of urbanization anticipated, the geographical extent of municipal water supply systems, the magnitude of water use per unit of manufacturing output and other factors which could influence the intensity of water use. An example of the estimates derived for this report for Winston-Salem follows:

Municipal Use				Manufacturing Use (Self Supplied)			Total
Year	Pop. a/	Gallons Per Capita Per Day b/	Use (MGD)	Manuf. Employment c/	Water Use Per Employee GPD	Use (MGD)	Municipal & Manuf. Use (MGD)
1960	189,428	147	28	25,952	800	21	49
1980	271,000	170	46	37,000	1,000	37	83
2000	457,000	200	91	63,000	1,250	78	169
2020	703,000	217	153	96,000	1,500	144	297

a/ Winston-Salem SMSA, actual and projected
b/ From Southeastern River Basin Report, 2020 value extrapolated
c/ Employment adjusted to reflect the percentage of employment

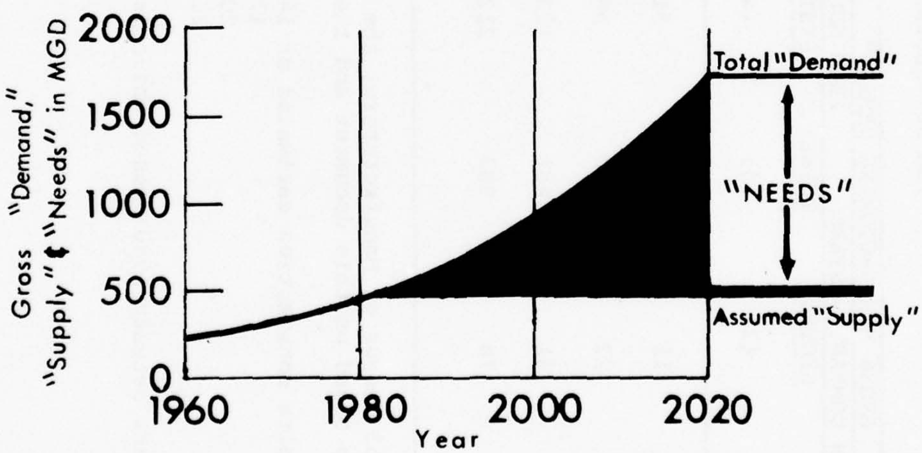

FIGURE 8-3. WATER SUPPLY, "DEMAND" AND "NEEDS"
SUB-REGION D

TABLE 8-3
ESTIMATED GROSS WATER DEMANDS AND NEEDS
FOR SUB-REGION D (IN MGD)

	GROSS MANUFACTURING DEMAND[a]							
	FROM COMPANY SYSTEMS			FROM MUNICIPAL		DOMESTIC[b]		
YEAR	SURFACE	GROUND	TOTAL	SYSTEMS	TOTAL	INTAKE	TOTAL	NEEDS[c]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1960	121	11	132	31	163	64	227	0
1980	228	22	250	59	309	132	441	0
2000	440	41	481	113	594	314	908	467
2020	825	78	903	212	1115	593	1708	1267

a SOURCE: The 1963 Census of Manufacturers; the distribution between ground and surface water sources is also based on this document and the Southeast River Basin Report.

b Per capita consumption estimated at 147 gallons in 1960
170 gallons in 1980
200 gallons in 2000
217 gallons in 2020, based on Southeast River Basin Report.

c Increment between 1980 demand which is assumed to be "supply" and gross needs.

On the other hand, Appendix D indicates a gross total demand of 125 mgd for Winston-Salem in 2020. The primary difference in the two estimates is in the estimated per capita daily consumption rate for municipal purposes -- 115 gpcd vs. 217 gpcd. The population base (Column 2 of above tabulation) also affects water use projections. The FWPCA report adopted the 1960 population at Winston-Salem - 138,600, as a base instead of the SMSA (Forsyth County) which was used in the above tabulation. Adoption of the SMSA as the appropriate base would appear realistic since urban growth is most likely to envelop the county to such a degree that all of the area would have municipal water service. The rather wide variance reflects a set of assumptions in each estimate reflecting a range from conservative to optimistic.*/

Local interests have displayed a consensus that the higher estimates are relevant planning parameters since the State of North Carolina, at the public hearing concerning the plan of development for the Upper Yadkin Basin**/, indicates support of the projects (Reddies, Roaring, Fisher and Mitchell River Reservoirs) as formulated and intent to cooperate fully with the District Engineer to carry the plan to completion. The combined net additional yield of the four reservoirs is about 123 mgd and together with the existing W. Kerr Scott would provide about 387 mgd for domestic and industrial purposes in the basin, in addition to minimum low flows of record. Therefore, the State and local interests essentially agree with the Corps analysis as to the approximate magnitude of the additional water supply needed.

The 1967 Conservation Needs Inventory (USDA) indicates about 31 percent of the watersheds with municipal and industrial water supply problems. The 10 upstream watersheds investigated revealed M&I water supply needs in the following six areas:

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*/ For instance, the Delaware River Comprehensive Report adopted daily per capita use rates varying to 230 gpcd in 2010 which would extrapolate to 245 gpcd in 2020. The higher values are actually "conservative" in the sense that plans and projects are not underscoped.

**/ Held 4 January 1968 at Winston-Salem, North Carolina (See Part VI.)

Location No.	River Basin or Watershed	County (ies)	State
60	North Oconee River	Hall, Jackson	Ga.
19	South Yadkin River	Alexander, Iredell	N.C.
19	Cherokee Creek	Cherokee	S.C.
20	Eighteen Mile Creek	Anderson, Oconee, Pickens	S.C.
22	North and Middle Tyger Rivers	Greenville, Spartanburg	S.C.
23	South Pacolet River	Greenville, Spartanburg	S.C.

The aggregate demand values presented in Table 8-3 appear to be adequate indicators of the magnitude of water needs. However, for more detailed analysis, another approach was adopted to reflect the saptial distribution and availability of ground and surface water supplies. For this analysis the estimate of gross water needs by growth centers over time was related to the supply which could reasonably be expected to be available as a source of potable water to each growth center by 1980. This analysis required a judgment of both quality and quantity availability. Both factors were introduced as constraints on available supply. Then the differences between gross needs and available supplies were calculated to indicate the magnitude of additional water supply sources which should be developed to meet the regional development objectives.

Table 8-4 presents the estimated gross demands for water by growth centers as of 1980, 2000, and 2020. The increment between gross demand in 2020 and dependable supply expected to be available in 1980 is referred to as unmet needs in Table 8-5, and the subject for planning studies outlined later. Table 8-6 presents the relative costs associated with the development of ground water supplies and the surface impoundment for the magnitude of unmet needs outlined in Table 8-5. The cost comparisons are necessarily oversimplified, because transmission costs are omitted, but do serve to indicate if ground water sources would clearly be competitive with surface impoundment at the level of needs anticipated. A summary of water supply (unmet) needs and alternatives is presented in Table 8-7.

Maintenance of Stream Quality

The establishment and maintenance of stream classification standards is primarily a state function, but a Federal interest is exerted through the Federal Water Pollution Control Administration (FWPCA). All water resource planning must be concerned with maintaining water quality. In recent years State requirements for waste treatment have induced a large investment in treatment facilities (See State Supplements of South Carolina and North Carolina). Heavy investments in such facilities are expected to continue until about 1980, but even then it is expected that additional water will have to be provided in certain streams to prevent nuisances arising during periods of low flow.

TABLE 8-4
ESTIMATED GROSS NEEDS FOR WATER SUPPLY IN MGD
GROWTH CENTERS IN WATER SUB-REGION D

ITEM	1980	2000	2020
NORTH CAROLINA			
Yadkin River Basin			
Wilkesboro-North Wilkesboro	10	19	33
Elkin-Jonesville	11	26	48
Mt. Airy	9	19	33
Winston-Salem	83	170	297
Catawba River Basin			
Lenoir	7	14	25
Morganton	9	19	33
Marion	6	12	21
Broad River Basin			
Rutherfordton-Forest City-Spindale	8	15	27
SOUTH CAROLINA			
Santee River Basin			
Gaffney	5	9	16
Easley-Greenville-Spartanburg	112	229	401
Savannah River Basin			
Seneca-Central-Liberty	8	17	30
Anderson-Belton	20	42	73
GEORGIA			
Oconee River Basin			
Jefferson	1	3	5
Winder	4	7	13
Commerce	2	4	6
Athens	23	41	60

TABLE 8-5
WATER SUPPLY NEEDS, AVAILABLE SUPPLY AND UNMET NEEDS
WATER SUB-REGION D

ITEM	GROSS DEMAND (2020) MGD	DEPENDABLE SUPPLY-MGD (By 1980)	UNMET NEEDS
NORTH CAROLINA			
Yadkin River Basin			
Wilkesboro-North Wilkesboro	33	> 33	--
Elkin-Jonesville	48	> 48	
Mt. Airy	33	12	21
Winston-Salem	297	262	35
TOTAL	411	332 a/	56
Catawba River Basin			
Marion	21	> 21	
Morganton	33	> 33	
Lenoir	25	> 25	
TOTAL	79	79 b/	--
Broad River Basin			
Rutherfordton-Forest City-Spindale	27	> 27	
SOUTH CAROLINA			
Santee River Basin			
Gaffney	16	10 d/	6
Easley-Greenville-Spartanburg	401	110 c/	291
TOTAL	444	147	297
Savannah River Basin			
Seneca-Central-Liberty	30	8 d/	22
Anderson-Belton	73	28 d/	45 f/
TOTAL	103	36	67
GEORGIA			
Oconee River Basin			
Commerce	6	1 d/	5
Winder	13	6 d/	7
Jefferson	5	1 d/	4
Athens	60	10 e/	50
TOTAL	84	18	66

a/ Controlling flows at Winston-Salem and at Mt. Airy; if Mt. Airy's needs are met the return flows would increase dependable flow at Winston-Salem's intakes; assumes Reddies Reservoir operational.
b/ Assuming Duke Power Co. continues policy of providing water supplies to all municipalities requesting supply.
c/ Controlling flow is yield from current reservoir storage.
d/ From PHS Inventory of Municipal Water Supply Systems.
e/ Computed low flow at Athens.
f/ Should be available from Hartwell Dam.

TABLE 8-6
ALTERNATIVE SOURCES AND COSTS FOR WATER SUPPLY
WATER SUB-REGION D [a]

Item	Alternative Costs for 1,000 Gal. dependable yield: Groundwater at wellhead	Alternative Costs for 1,000 Gal. dependable yield: Surface Storage at Site	Note
Yadkin River Basin	$0.05	$0.0062	Average costs for Roaring and Reddies River Reservoir
Broad & Santee River Basins	$0.11	$0.0055	Average costs for Clinchfield Reservoir
Savannah River Basin	$0.05-0.25	$0.003-0.0055	Range of Costs for Eighteen Mile Creek Watershed and Clinchfield Reservoir
Oconee River Basin	$0.05-0.25	$0.0053	Average costs for Curry Creek Reservoir

a/ These costs omit transmission costs. Small users may find that groundwater offers a much more economical source.

TABLE 8-7
WATER SUPPLY NEEDS AND ALTERNATIVES
WATER SUB-REGION D

ITEM	UNMET NEEDS IN MGD 2020	ALTERNATIVE PROJECTS	DEPENDABLE YIELD IN MGD	
			Gross	Net
YADKIN RIVER BASIN				
Mt. Airy, N.C.	21	Fisher River Reservoir	80	71
Winston-Salem, N.C.	35	Roaring River Reservoir	34	16
		Mitchell River Reservoir	36	18
		Fisher River Reservoir	80	71
SANTEE RIVER BASIN				
Gaffney, S.C.	6	North & Middle Tyger Watershed	6	NA
Easley-Greenville-Spartanburg, S.C.	291	S. Pacolet Watershed	12	NA
		Clinchfield Reservoir	443	443[a]
SAVANNAH RIVER BASIN				
Seneca-Liberty-Central, S.C.	22	Eighteen Mile Creek Watershed	4	NA
OCONEE RIVER BASIN				
Commerce, Ga.	5	N. Oconee River Watershed	0.3	NA
		Curry Creek Reservoir	60	60[b]
Winder, Ga.	7	Curry Creek Reservoir	60	60[b]
Jefferson, Ga.	4	Curry Creek Reservoir	60	60[b]
Athens, Ga.	50	Curry Creek Reservoir	60	60[b]

a/ In addition to meeting low flow release schedule for water quality purposes.

b/ In addition to minimum release of 10 c.f.s.

Projected stream pollutional loadings for Sub-region D are given in Appendix D of this report, written by the FWPCA. This Appendix shows that untreated waste loadings, expressed in millions of population-equivalents, will be 4.2, 5.6, 9.1, and 16.7, in 1960, 1980, 2000, and 2020, respectively. These figures refer to loadings before treatment, and are specific indicators of the investment required in new treatment facilities. While this Appendix does not pinpoint specific problem areas, certain problem areas have been studied separately in some detail by the FWPCA.*/

In the Yadkin River the agency found a problem area below the mouth of Muddy Creek and above the mouth of South Yadkin River, derived mainly from waste loads entering Muddy Creek from the Winston-Salem area. The FWPCA study indicates that beneficial use of this reach, for purposes not involving water contact, can be maintained until 2020 if 35,000 acre-feet**/ of water quality storage is provided in reservoir(s) in the Upper Yadkin, assuming secondary waste treatment.

In the Broad River Basin, the agency found that the Pacolet, Tyger, and Enoree Rivers would experience water quality problems between 1980 and 2000, even assuming that only the Pacolet River, which receives the municipal and industrial wastes of the Spartanburg area, would exert significant influence on the water quality of the Broad River by 2020. The agency considered several alternative means of mitigating the effect of these Pacolet-borne wastes (discussed later), and recommended further studies on the Tyger and Enoree Rivers.***/ The detailed studies by FWPCA in Appendix D considered only those areas downstream from projects under detailed study for the Appalachian Report. Thus, other areas were left with only estimates of gross untreated waste loadings. In order to present a more complete view of potential water quality problems, the gross waste loadings were converted into needs for dilution by assuming 85% treatment at the source and estimating flow deficiencies by a shortcut procedure. The results of this analysis are admittedly inadequate to firmly justify addition of water quality storage, but are considered adequate to indicate the relative magnitude of needs for dilution water after 85% treatment. Needs for water quality storage presented in Table 8-8 contain estimates from both the FWPCA studies and Corps of Engineers studies. Definite storage allocations in considered projects were restricted to these needs confirmed by FWPCA.

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*/ Appendix D, Water Supply and Water Pollution Control, Federal Water Pollution Control Administration.

**/ All needs for water quality control have been converted from flow requirements at selected stations to storage requirements in acre-feet by estimating deficiencies from a mass curve, and assuming that the storage would be located above the point of need and in an impoundment which would have adequate inflows to refill annually.

***/ In this respect, attention is called to the comprehensive study, including water quality, being undertaken by the State of South Carolina.

TABLE 8-8
WATER QUALITY NEEDS, ALTERNATIVES AND NEEDS SATISFIED
GROWTH CENTERS IN WATER SUB-REGION D

ITEM	Needs (000AF)	River Roaring	Mitchell	Clinchfield	Curry Creek	Satisfied Needs	Unsatisfied Needs
NORTH CAROLINA							
Mt. Airy	11					--	11
Winston-Salem	23	18	5 c/			23	--
Lenoir	8					--	8
Morganton	11 a/						11 a/
Marion	7 a/						7 a/
Rutherfordton-Spindale-Forest City	9			9 b/		9	--
SOUTH CAROLINA							
Gaffney	6			6 b/		6	--
Easley-Greenville-Spartanburg	132			90		90	42
Seneca-Central-Liberty	10						10
Anderson-Belton	25					--	25
GEORGIA							
Commerce	2					--	2
Winder	4					--	4
Jefferson	2					--	2
Athens	17						17
TOTAL FOR GROWTH CENTERS	262						
SUB-REGION D TOTAL	413						

a/ Should be corrected by normal releases from Lake James.

b/ Met by releases against flow objective downstream from Pacolet River.

c/ May be reallocated back to Roaring in AE&D.

The Reedy River, which flows through Greenville, receives wastes from the city of Greenville (which supplies secondary treatment), and from a number of textile mills in the area. The State of South Carolina is working with these industries to evolve suitable abatement plans, and facilities are expected to be completed in the near future. Even then problems requiring low flow augmentation will remain in the Reedy River, and dyes, particularly, are expected to be a continuing problem. The problems of the Reedy require further study.

Many programs of the U.S. Department of Agriculture play an important role in the maintenance of stream quality. Particularly important are those programs concerned with development of upstream watersheds, the proper use of all land, and its treatment and management to control erosion and reduce sediment. There are five principal programs:

a. Upstream Watershed Program (PL-566).

b. Technical assistance by the Soil Conservation Service to individual landowner, operator, or user in determining proper land use and planning, installing the needed conservation practices and measures, and technical assistance on forest land by State Forester in cooperation with U.S. Forest Service.

c. Cost sharing by the Agricultural Stabilization and Conservation Service with landowners and operators for carrying out needed conservation practices and measures, under either ACP or Sec. 203, PL 89-4.

d. Water development and soil conservation loans by the Farmers Home Administration to landowners and operators in putting into effect basic soil and water conservation plans.

e. Management of National Forests to maintain high quality runoff. Emphasis is needed on proper land use and those conservation measures and practices to stabilize eroding gullies, channels, roadbanks, ditches, strip-mine spoil, and new residential, industrial, and highway construction, and to improve all vegetative cover. The programs can help provide improved water quality management in the sub-region. Table 8-8 compares water quality needs, alternatives and needs satisfaction by growth centers.

Power

Sub-region D lies in Power Supply Area 21 and 23. There is no constraint to economic growth forseen from a shortage of electric power in Sub-region D. In 1970, it is expected that power requirements for Appalachia will be 177,000 gigawatts (1,000,000 KW). Approximately 100,000 GW will be required in Sub-region D. By the year 2020, requirements in Sub-region D will approach 1,300,000 GW.

A discussion concerning electric power needs, proable future installation of generation capacity, and cooling water needs for the Appalachian Region, by sub-region, is contained in Chapter 4, Part I.

Recreation

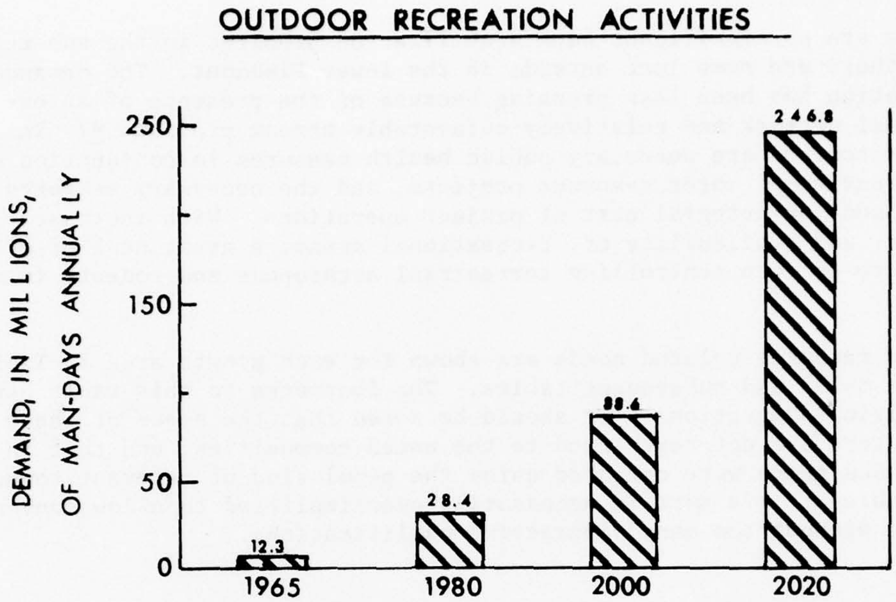
A huge deficit or unsatisfied demand for outdoor recreation opportunities is expected by the year 1980 in Sub-region D. The "demand" is estimated to be 28,400,000 recreation days (1980) which would require about 130,000 acres of water to meet this level of needs for boating, swimming, camping, picnicking, hunting and fishing. The Appendices prepared by the Bureau of Outdoor Recreation and the Fish and Wildlife Service present a detailed discussion and additional projections to the year 2020.

Information from these Appendices has been summarized and graphically shown in Figure 8-4. It will be noted that all activities have been reduced to a common measure--man-days annually. Again, the figure shows "needs," as previously defined, and as explained in the footnotes thereto. It will be noted that in this figure, a separate chart is shown for the water using portion of outdoor recreation needs. Since the emphasis in this report is on water resources, it has been necessary to recognize that certain activities require a rather definite water surface area, while others are less directly related to water surface. A summary of water using recreation needs and means for their satisfaction considered in this report is presented in Table 8-9. Needs are derived as the increment between demand in 1980 and 2020.

Development of additional public and private outdoor recreation facilities can be accelerated through various programs of the U.S. Department of Agriculture. Increased technical and financial assistance to landowners, operators, small rural and urban groups, and others cooperating with soil conservation districts can accelerate land use conversion to, and development of, recreation areas.

There are 235,000 acres of National Forest lands available for public recreation use within the Sub-region. Recreation use, in these areas, has steadily increased over the years with 355,000 visitor days recorded in 1966. Studies indicate that recreation use will increase to approximately 1.8 million visitor days within the next decade (See Appendix F for full discussion).

It should be noted that the provision of recreational opportunities is the responsibility of many entities--Federal, State, municipal, county, and private. The South Carolina Supplement describes planned development for that state.



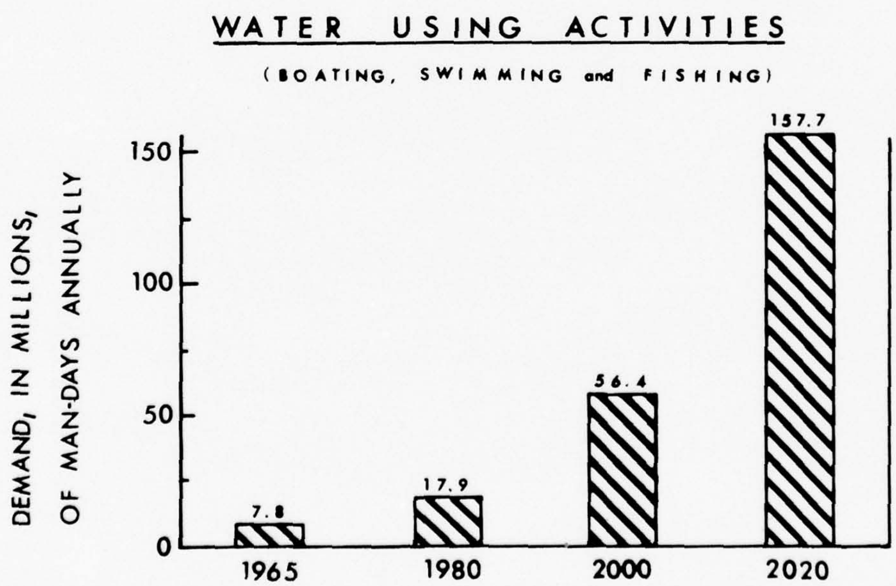


Figure 8-4. Projected Demand for Water Using & Outdoor Recreation Opportunities in Sub-region D.

Other and Summary

There are no significant bank stabilization problems in the sub-region, although there are some just outside in the lower Piedmont. The demand for navigation has been less pressing because of the presence of an extensive rail network and relatively unfavorable stream profiles.*/ Insect and vector control are necessary public health measures in conjunction with the construction of water resource projects, and the necessary measures are generally made an integral part of project operations. With increased demand for, and availability of, recreational areas, a great deal of effort will have to go into controlling terrestrial arthropods and rodents in such areas.

Water resource related needs are shown for each growth area in Table 8-10 (Page 8-33) and subsequent tables. The footnotes to this table explain the underlying assumptions. It should be noted that the needs of these growth centers are not restricted to the named communities, and that in certain cases needs were computed using the population of relevant townships, etc. A table of this sort is necessarily oversimplified to allow convenient comparison without too many distracting qualifications.

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*/ Proposals have been advanced for improvement of the Upper Savannah River to connect to the Upper Tennessee. A survey investigation has been authorized in the 1968 River and Harbor Act.

TABLE 8-9
WATER USING RECREATION NEEDS AND ALTERNATIVES
WATER SUB-REGION D

ITEM	Annual Recreation Days (1,000)
Recreation Needs	139,800[a]
Projects (Ultimate Use)[b]	
Roaring River Reservoir	210
Mitchell River Reservoir	140
Fischer River Reservoir	250
Clinchfield Reservoir	5,700
Curry Creek Reservoir	1,500
Camp-Cane Creek Watershed, N.C.	27[c]
Turner Creek Watershed, S.C.	--
Little Beaver Dam Creek Watershed, S. C.	8[c]
North Oconee River Watershed, Ga.	--
Hunting-Bear Creek Watershed, N.C.	15[c]
Upper South Yadkin River Watershed, N.C.	18[c]
Cherokee Creek Watershed, S.C.	16[c]
Eighteen Mile Creek Watershed, S.C.	68[c]
North and Middle Tyger Watershed, S.C.	92[c]
South Pacolet River Watershed, S.C.	105[c]

a/ The increment between needs met in 1980 and 2020 demand for water using activities (See Figure 8-4).

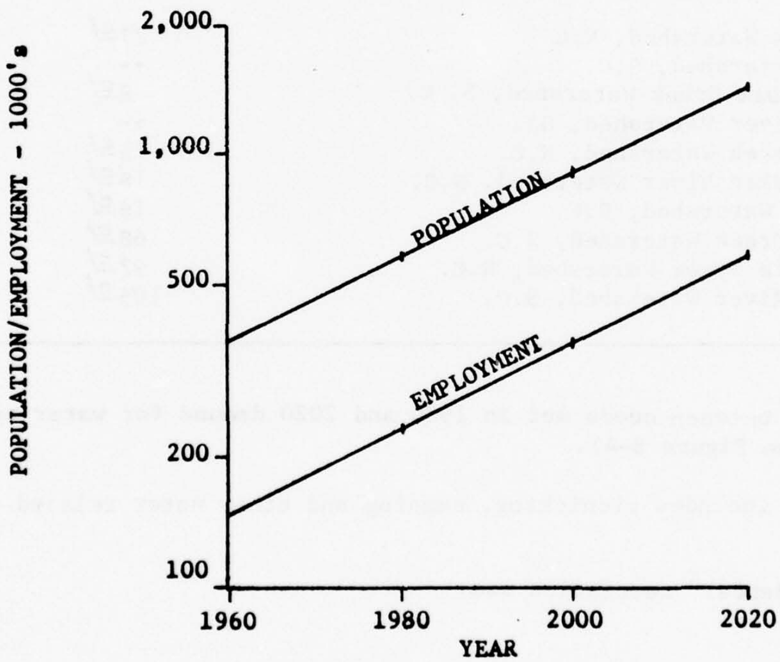
b/ Estimated use includes picnicking, camping and other water related activities.

c/ Include "incidental" recreation use.

8. WATER RESOURCE NEEDS BY RIVER BASINS

The broad water needs previously discussed for the sub-region were disaggregated to river basins and sub-basins. A primary determinant of water needs is the implication of the economic analysis contained in paragraph 5 of Chapter 7, and in Section I of Chapter 8. While the state planning sub-regions do not follow river basin divisions, there is enough commonality in areas to indicate trends and relative magnitude of possible population and employment growth by each basin. The following paragraphs relate the economic analysis by state planning sub-regions and the major river basin areas.

Yadkin River. The Yadkin River Basin is generally contained within State Planning Sub-regions 48 and 49. The following chart indicates the magnitude of population and employment implied by the developmental benchmark objectives.



STATE PLANNING SUB-REGIONS 48 & 49
(YADKIN RIVER BASIN)

Several growth centers are located within the Appalachian portion of the Yadkin River Basin, including Winston-Salem, North Carolina, the primary growth center, and Mt. Airy, Elkin-Jonesville, and Wilkesboro-North Wilkesboro, North Carolina. Greensboro, North Carolina is located

near Winston-Salem outside of Appalachia in the headwaters of the Cape Fear River Basin, and its potential growth indicates a possible dependence for water supply from the Yadkin River Basin. Needs for flood control in the upper Yadkin River Basin are more pronounced than for other sections of Water Sub-region D because of the topographic characteristics of the area which have placed much heavier development in the flood plain. Continuing growth will increase the pressure on flood plain development and increase flooding hazards.

Development of water storage and conveyance systems appears to be an important requirement on water resources development in the upper Yadkin River. Increases in population and employment, as well as increase in per capita water use will very likely outstrip available supplies by about 1980.

Storage and regulation for dilution water will be required to maintain any reasonable set of water quality standards as the economy grows. The growing concentration of urban population accompanied by higher incomes and more leisure periods will require an addition to the stock of outdoor recreation opportunities in the sub-region. The same factors including industrial development will increase the pressure or the requirements for additional power. Estimated needs for the various growth centers in the Yadkin River Basin are detailed in Table 8-10.

TABLE 8-10. ESTIMATED WATER RESOURCE NEEDS TO SUPPORT FUTURE GROWTH OF GROWTH CENTERS IN SUB-REGION D a/

STATE/RIVER BASIN/GROWTH CENTER	WATER SUPPLY (MGD) b/	FLOOD CONTROL CURRENT DAMAGE $1,000 c/	FLOOD CONTROL FLOODED AREA ACRES d/	RECREATION DAYS (1,000) e/	WATER QUALITY (1,000 AF)
NORTH CAROLINA					
YADKIN RIVER BASIN					
Wilkesboro-N. Wilkesboro	-	1	-	700	3
Elkin-Jonesville	-	54	146	600	3
Mt. Airy	21	11	790	2,400	11
Winston-Salem	35	20	580	15,000	23
CATAWBA RIVER BASIN					
Lenoir		-	260	1,800	8
Morganton		f/	370	2,500	11
Marion		-	200	1,600	7
BROAD RIVER BASIN					
Rutherfordton-Spindale-Forest City		5	290	2,000	9
SOUTH CAROLINA					
SALUDA RIVER BASIN					
Gaffney	6	12	60	1,200	6
Easley-Greenville-Spartanburg	291	76	1,560	16,100	132
SAVANNAH RIVER BASIN					
Seneca-Central-Liberty	22	26	30	2,200	10
Anderson-Belton	55	1	60	5,500	25
GEORGIA					
OCONEE RIVER BASIN					
Jefferson	4	4	60	400	2
Winder	7	-	80	900	4
Commerce	5	-	60	500	2
Athens	50	91	510	3,700	17
TOTAL GROWTH CENTERS	495	301	5,056	57,100	273
TOTAL SUB-REGION D	1,274	1,050	g/	139,800	413

a/ Needs are expressed in terms of the increment between "supply" of, and "demands" for the water goods and services to 2020.

b/ Derived from estimate given in Table 8-2.

c/ Residual damages remaining after 1980 (1967 development).

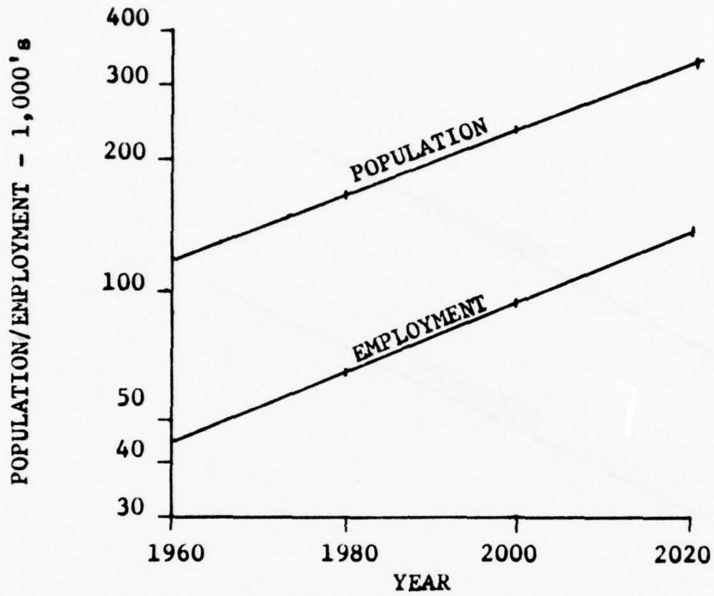
d/ Additional flood plain area anticipated to be used for urban uses by 2020 in the damage reach containing growth center.

e/ Limited to water using activities.

f/ Undefined.

g/ Total estimated needs for urban land uses by 2020 in Sub-region D is 365,000 acres with 205,000 acres in growth centers. Adequate supply of land is available to meet this level of use.

Catawba River Basin. State Planning Sub-region 47 in North Carolina includes the greater portion of the Catawba River Basin. The following chart indicates the magnitude of population and employment implied in the developmental benchmark objectives for this particular state planning sub-region.

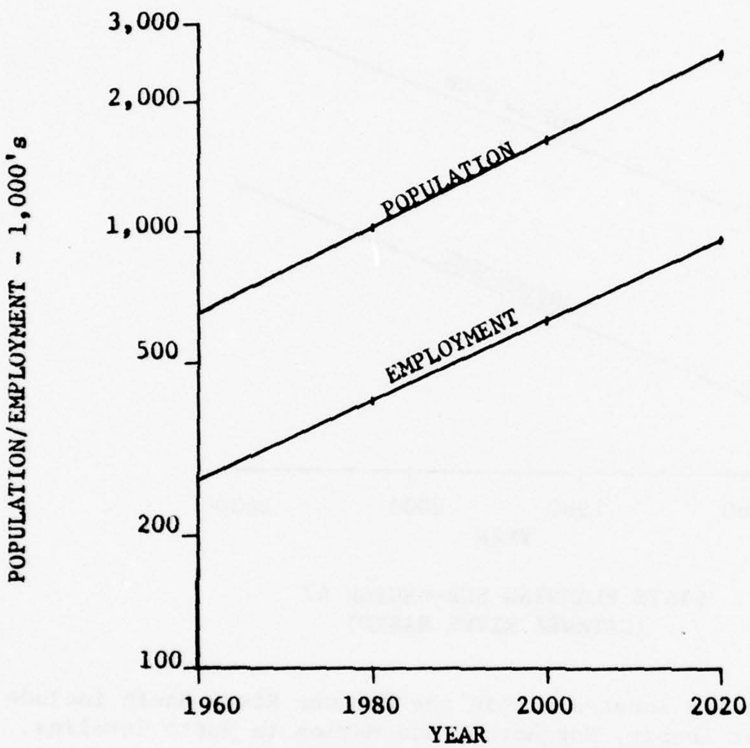


STATE PLANNING SUB-REGION 47
(CATAWBA RIVER BASIN)

The growth centers located within the Catawba River Basin include secondary centers at Lenoir, Morganton, and Marion in North Carolina. Flood control problems in this particular river basin, as associated with the growth centers, are relatively minor although at Morganton there is a potential for damage, dependent on rainfall-runoff conditions and degree of storage depletion in existing upstream power reservoirs. Additional water supply needs are indicated for the growth centers in the sub-region as well as some additional low-flow releases to maintain acceptable water quality. Of course, growing population, income and employment will increase the needs for recreation and electrical energy within this river basin. See Table 8-10 for a detailed estimate of needs by growth center for the Catawba River Basin.

Broad and Saluda River Basins. Broad and Saluda Rivers, located in North and South Carolina, and State Planning Sub-regions 45 and 50, approximate the area covered by the river basins within Appalachia.

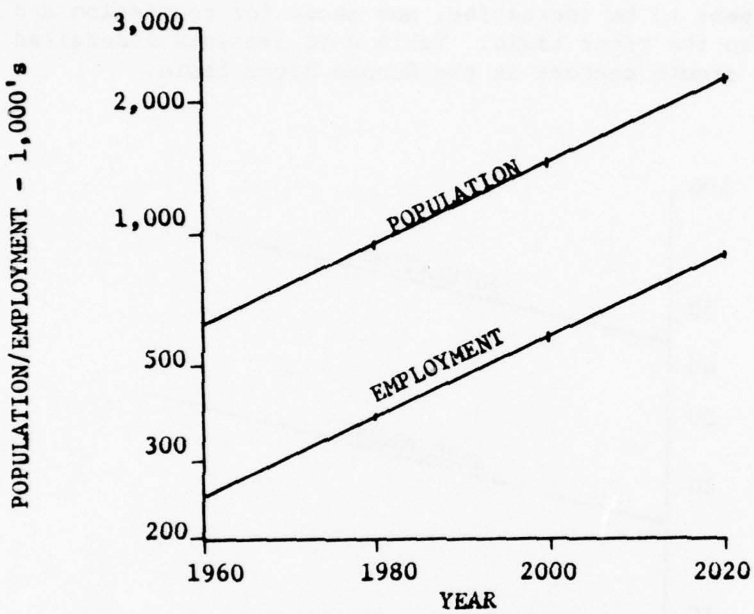
Within the Basin there are primary growth centers including the Greenville, Spartanburg and Easley, South Carolina areas, Gaffney, South Carolina and secondary centers at Rutherford-Spindale-Forest City in North Carolina. The following chart indicates the magnitude of population and employment implied by the developmental benchmark objectives for State Planning Sub-regions 45 and 50 in Water Sub-region D.



STATE PLANNING SUB-REGIONS 45 AND 50
(BROAD RIVER BASIN)

The dominant water needs appear to be for water supply, especially for the South Carolina growth centers. Flood control needs are relatively minor and isolated in terms of spatial distribution. The requirements for water quality appear to be fairly heavy due to the concentration of expected population and employment increases in the river basin, and, of course, recreation and power needs reflect both population and employment increases as well as the expected increase in income. Table 8-10 presents a detailed estimate of water needs by growth centers in the Broad and Saluda River Basins.

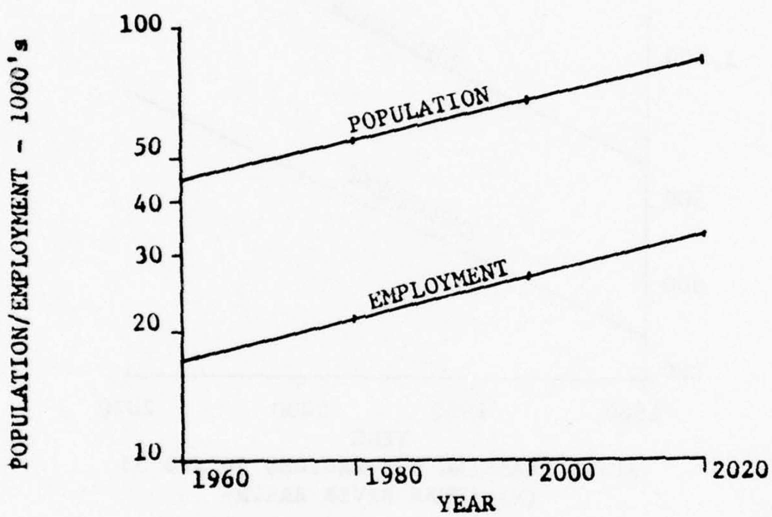
Savannah River Basin. Savannah River Basin in South Carolina and Georgia drains parts of State Planning Sub-regions 50 and 53. The following chart indicates the magnitude of population and employment increases by the developmental benchmark objectives.



STATE PLANNING SUB-REGIONS 50 AND 53
(SAVANNAH RIVER BASIN)

The primary growth center within the Savannah River Basin is the Anderson-Belton, South Carolina areas; the Seneca-Central-Libery, South Carolina areas represent a secondary growth center. Flood control needs for this particular river basin as related to the growth centers do not appear to be very significant, but there are, of course, water supply and water quality needs and recreation and power needs associated with projected increases in population and employment and incomes. The detailed estimates of water needs by the growth centers within the Savannah River Basin portion of Appalachia are listed in Table 8-10.

Oconee River Basin. The Oconee River Basin in Georgia is an area approximated by State Planning Sub-region 53. The following chart indicates the magnitude of population and employment implied in the developmental benchmark objectives for State Planning Sub-region 53. Athens, Georgia, which is located on the border of Appalachia, is a primary growth center associated with the Appalachian section of the Oconee River Basin. Winder, Commerce and Jefferson are secondary growth centers. Again flood control needs appear to be less significant than for many portions of Appalachia, while water supply needs are evident, water quality needs appear to be increasing, and needs for recreation and power are significant in the river basin. Table 8-10 presents a detailed estimate of needs by growth centers in the Oconee River Basin.



STATE PLANNING SUB-REGION 53
(OCONEE RIVER BASIN)

Other River Basins. A small part of the extreme upper end of the Ohio River Basin in Ashe and Alleghany Counties, North Carolina occurs in State Planning Sub-region 48, and the Roanoke River Basin in Forsyth and Stokes Counties, North Carolina in State Planning Sub-region 49. The upper reaches of the pending Blue Ridge Reservoir would extend into State Planning Sub-region 48. The authorized Town Fork Creek Upstream Watershed Project in Stokes and Forsyth Counties, North Carolina is being installed under USDA PL-566 Program.

9. INTER-BASIN AND INTERSTATE TRANSFER OF WATER

Several of the growth centers, both in and contiguous to the subregion, are located high in the drainage basin resulting in a limitation of capability of the streams to provide an adequate water supply. If these areas are to continue their current growth rate, it will probably become necessary to acquire an adequate supply of water from other drainage basins.

Clinchfield Reservoir is formulated on the premise of providing water for a multi-county area in both North and South Carolina. This will entail transfer of water between several headwater watersheds, all of which are tributaries of the Santee River.

A study is being programmed on the Saluda River which would transfer water to the Reedy River Basin for water quality and water supply.

The Greensboro-High Point - Thomasville - Winston-Salem growth complex of North Carolina will require additional water supply in the near future. The Yadkin River would be one of the logical areas for this supply. This could mean transfer water from the Yadkin-PeeDee Basin to the Cape Fear Basin, although project studies proceeding in the Cape Fear Basin indicate that sufficient water resource development can be made available within the Basin to meet the needs. Therefore, the choice should be limited to relative economics of alternative proposals.

SECTION III - ALTERNATIVES FOR MEETING NEEDS

10. STRUCTURAL

Structural alternatives have been selected from an array of Federal, State and private water resource development opportunities. Alternatives considered include both improvement and non-improvement. Consideration for provision of flood protection includes storage of flood flows in impoundments, levees, flood walls, channel improvements, and combinations of these. Alternatives for provision of water supply considered both surface and groundwater sources. Water quality improvements would be accomplished by the most advantageous means, whether by dilution or by a higher degree of treatment of water. The relevant structural alternatives are discussed below.

Yadkin River Basin

There are four growth centers located in the Yadkin River Basin of which one, Winston-Salem, is classified as primary. The remaining three, Mount Airy, Elkin-Jonesville, and Wilkesboro-North Wilkesboro, are classified as secondary.

Wilkesboro-North Wilkesboro. The most serious water related problem in this growth center is flood damage along both the Yadkin River and at the mouth of Reddies River. The damage results from high flow in Reddies River. About 300 acres of the flood plain will be needed for urban uses by 2020. There does not appear to be a need for additional municipal and industrial water supply, and only a minor need for water quality improvement. The authorized Reddies River Reservoir will reduce current flood damage to about $1,000 per year. This project is expected to be constructed prior to 1980.

Elkin-Jonesville. A water related problem in the Elkin-Jonesville growth center is flood damage, the result of flood flow primarily from the left bank tributaries, Roaring and Reddies Rivers. Current flood damages amount to about $89,000 annually. Future needs for urban land use of the flood plain is estimated to be 230 acres by 2020. Land for industrial sites in this growth center is generally in the flood plain, the side-hill slopes being too steep for such use. There appears to be no problems concerning water supply for domestic and industrial purposes, and only minor need for water quality improvement. Flood protection provided by the authorized Reddies River Reservoir, expected to be in operation by 1980, will reduce current flood damage to about $54,000 per year. The potential Roaring River Reservoir would provide a further reduction.

Mount Airy. The water related problems at Mount Airy growth center include flood damages from Stewarts and Lovills Creeks, and from the Ararat River. Current damages approximate $55,000 annually, while anticipated needs for flood plain lands to be utilized for urban uses approximate 790 acres by 2020. Current damages will be reduced to about $11,000 per year when the USDA Project on Stewarts-Lovill Creeks is completed, expected prior to 1980. About 33 mgd for municipal and industrial water supply and 11,000 acre-feet for water quality improvement purposes will be needed prior to 2020. The Stewarts-Lovill Creek project, together with increased raw water storage will increase dependable supply to about 12 mgd which would leave a residual need for 21 mgd for water storage and the water quality needs to be met, from the Ararat River, or by diversion from the potential Fisher River Reservoir.

Winston-Salem. The water related problems that will affect, to some degree, the industrial growth in this area are: flood damage; water supply; and water quality control. The flood damage problem results from local tributaries, including Muddy Creek, and currently amounts to about $20,000 per year. A need for about 530 acres of flood plain lands to be placed in urban uses by 2020 is anticipated. Water

supply needs for this area are estimated at 83 mgd, 170 mgd, and 297 mgd by the year 1980, 2000, and 2020 respectively. To meet these needs are the existing W. Kerr Scott Reservoir; the authorized Reddies River Reservoir; and potential reservoirs on Roaring, Mitchell and Fisher Rivers; main steam reservoirs at the Upper Donnaha and Styers Ferry sites; authorized Upstream Watershed Projects on Deep Creek and Little Yadkin River; potential Upstream Watershed Project on Turner Creek, and flood plain management.

Other. It is estimated that facilities capable of providing an additional 18.7 million annual days of water oriented recreation will be required between 1980 and 2020. Most of this would be required for the reach below Winston-Salem. It is estimated that needs for additional peak demand for electrical energy will amount to 12.64 gigawatts, and for annual energy consumed will amount to 70,850 gigawatt-hours.

Catawba River Basin

The three secondary growth centers located in the Catawba River Basin include Lenoir, Morganton, and Marion.

Lenoir. There are no significant flood damage or water supply requirements that would impede growth in the Lenoir area. There are ample lands suited for industrial, commercial, municipal, and residential development with a need of about 260 acres of flood plain land to be put into urban uses by 2020. Water for industrial and municipal purposes is readily available from the impoundments, on the Catawba River, owned by the Duke Power Company. Some need for water quality improvement is foreseen.

Morganton. Water resources development, or lack of development, does not appear to be a serious constraint to growth in this growth center. There is a potential for flood damage since the power dams upstream may not provide an adequate reserve of storage for flood flows. There is a need to study this problem to determine whether additional protective measures are needed. The authorized Muddy Creek Upstream Watershed Project would provide flood prevention and other benefits in a part of the rural area. Water quality improvement needs may be met by hydropower releases from Lake James. About 570 acres of flood plain land will be needed for urban development by 2020.

Marion. There are no significant water resource developmental needs for this growth center although about 200 acres of flood plain lands are needed for urban development by 2020.

Other. Water oriented recreation opportunities in this basin are currently provided by the impoundments of the Duke Power Company, Lake James, Rhodiss Lake, and Lake Hickory. It is estimated that additional facilities capable of providing 5.9 million days of water oriented recreation will be required between 1980 and 2020. Flood plain management will be needed along some of the minor streams as these growth

centers expand. The additional need for peak demand of electrical energy is expected to reach 4.02 gigawatts with an annual consumption of 25,320 gigawatt-hours.

Broad and Saluda River Basins

Rutherfordton-Spindale-Forest City. This secondary growth center, located in the Broad River Basin, appears to have few water related constraints to growth. Flooding causes about $5,000 annual damage and there is no apparent deficiency in water supply. Some additional flow will be needed for water quality purposes, and an estimated need for 290 acres of flood plain lands to be put into urban uses is anticipated by 2020.

The area-wide need for additional outdoor recreation opportunities approximate 2.0 million days by 2020, while peak power demands is expected to increase 1.38 gigawatts and annual consumption expected to increase 7,700 gigawatt-hours annually.

Saluda River Watershed

There are two primary growth center areas in the Saluda River Basin; Easley-Greenville-Spartanburg, and Gaffney.

Easley-Greenville-Spartanburg. This growth center experiences an average of about $380,000 of flood damages annually from the Reedy, South Pacolet, North and Middle Tyger Rivers, and from Georges and Cherokee Creeks. Improvements on Georges Creek and Reedy River prior to 1980 are expected to reduce the flood damage to about $76,000 annually. A need for 1,560 acres of flood plain land to be placed in urban uses by 2020 is anticipated. It is estimated that this growth center will require an additional 291 mgd of water for municipal and industrial purposes between the years 1980 and 2020. During that same period, it is estimated that there will be a requirement for 132,000 acre-feet of water for water quality improvement purposes*/ and that the water-oriented recreation needs will amount to about 16.1 million recreation days annually. The peak demand for electrical energy is expected to increase 11.0 gigawatts, and the annual consumption of electrical energy is expected to increase 60,800 gigawatt hours. To meet these needs, consideration will be given to authorized upstream watershed projects on Georges Creek, and the South Tyger River; to potential watershed projects on North and Middle Tyger Rivers and on the South Pacolet River; to Clinchfield Dam and Reservoir, located on the Broad River and to a potential impoundment on the Saluda River below the juncture of the north and south forks of that stream; and also to the Duke Power Company's Keeowee-Toxaway project.

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*/ A need for 90,000 acre-feet on the Broad River was confirmed by FWPCA in Appendix D.

Gaffney. Tributaries of Thicketty Creek cause current annual flood damages of about $50,000 in this growth center. It is expected that improvements presently planned and authorized will reduce current damage to about $12,000 by 1980. About 50 additional acres of flood plain land is expected to be developed for urban uses by 2020. An additional six mgd of water will be required for municipal and industrial purposes between 1980 and 2020, and about 6,000 acre-feet of water will be required annually for water quality improvement purposes. The water-oriented recreation needs are estimated to be 1.2 million recreation days for this period. Peak demand for electric energy will increase by about 0.84 gigawatts, while annual energy consumption will increase by about 4,600 gigawatt-hours. Projects to be considered to meet the water-related needs include the potential Cherokee Creek Upstream Watershed Project, and Clinchfield Dam and Reservoir on the Broad River.

Savannah River Basin

The two growth centers located in the Savannah River Basin portion of Water Sub-region D are Anderson-Belton (Primary Growth Center) and Seneca-Central-Liberty (Secondary Growth Center), South Carolina.

Anderson-Belton. Annual flood damages of about $11,000 are experienced in the Anderson-Belton growth center, mostly from flooding of Wilson Creek. It is expected that this flood damage will be reduced to an annual amount of about $1,000 by 1980, as a result of authorized Wilson Creek Upstream Watershed Project. About 60 acres of flood plain land is anticipated to be needed for urban development by 2020. This growth center will require about 55 mgd for municipal and industrial water supply purposes between 1980 and 2020. An additional 25,000 acre-feet of water will be required annually for water quality control. Facilities to supply water-oriented recreation in the amount of 5.5 million recreation days will also be needed. During this same period, it is expected that the peak demand for electrical energy will increase by 3.66 gigawatts, and that the annual energy consumed will increase 20,600 gigawatt-hours. Consideration should be given to operating Hartwell Reservoir, Duke Power Company's Keowee-Toxaway Project, and the authorized Wilson Creek Watershed Project to meet all or a part of these needs.

Seneca-Central-Liberty. Flood damages in the Seneca-Central-Liberty growth center amount to about $26,000 annually, mostly as a result from overflows from Eighteen Mile Creek. About 30 acres of flood plain land is anticipated to be needed for urban uses by 2020. The growth center is expected to need an additional 22 mgd of water for municipal and industrial purposes in the period 1980 to 2020, along with about 10,000 acre-feet of water annually for use in water quality improvement. Facilities for water-oriented recreation to meet a demand of 2.2 million recreation days will be needed. It is estimated that the peak demand for electrical energy in this growth center area will increase 1.5 gigawatts, with an annual increase in consumption of electrical energy of 18,400 gigawatt-hours. To meet the water-related needs in this growth center, consideration will be given to the existing Hartwell Dam and Reservoir,

the Duke Power Company's Keowee-Toxaway Project, and authorized upstream watershed projects on Coneross Creek, Three-and-Twenty Mile Creek, Twelve Mile Creek, and the potential Little Beaver Dam, and Eighteen Mile Creek upstream watershed projects.

Oconee River Basin

The Oconee River Basin in Georgia has four growth centers, of which one, Athens, is considered primary. The others, classified as secondary, are Winder, Commerce and Jefferson.

Athens. Flood damages in the Athens growth center amount to about $108,00 annually, and mostly result from flooding of North and Middle Oconee Rivers, and from Little Sandy and Trail Creek. It appears that the authorized upstream watershed project, on Sandy, Little Sandy and Trail Creeks, will be completed prior to 1980, and will reduce the annual flood damage to about $91,000. About 510 acres of flood plain lands will be needed for urban uses by 2020. In the period 1980 to 2020, the Athens growth center will have need of an additional 50 mgd water supply, and about 17,000 acre-feet of water quality storage annually.*/ The water-oriented recreation needs for this growth center are estimated to be 3.7 million recreation days. It is also estimated that the peak demand for electrical energy will increase 2.59 gigawatts, and the energy consumed annually will increase 13,900 gigawatt-hours. Consideration for meeting the above described needs in the Athens growth area will be given to the Curry Creek Reservoir, located on the North Oconee River; the recommended North Oconee River Upstream Watershed Project; and possible modification of the upstream watershed projects on Sandy Creek and Little Sandy and Trail Creeks.

Winder. There is little, if any, flood damage in the Winder growth center, although about 80 acres of flood plain lands will be needed for urban uses by 2020. It is estimated that in the period 1980 to 2020, this growth area will require an additional 7 mgd water supply, and about 4,000 acre-feet of water annually for water quality improvement. Water-oriented recreation needs are estimated to be about 900,000 recreation days per year. The peak electrical demand will increase by 650 megawatts, with an increase in annual consumption of 3,500 gigawatt-hours. To meet these needs, consideration will be given to possible modification of the completed Barber Creek and Marbury Creek Upstream Watershed Projects. The possibility of diversion from the Curry Creek Reservoir will also be given consideration.

Commerce. The Commerce growth center experiences little, if any, flood damage; however, about 60 acres of flood plain land is anticipated to be needed for urban uses by 2020. Estimated water supply needs will

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*/ FWPCA in Appendix D found no need for additional flow augmentation for water quality purposes.

amount to 5 mgd and the water quality needs will amount to 2,000 acre-feet annually in the period 1980 to 2020. During this same period, it is estimated that the water-oriented recreation needs will amount to 500,000 recreation days per year; and the increase in peak demand for electrical energy will be 320 megawatts and the increase in annual consumption of electrical energy will be 1,770 gigawatt-hours. The Curry Creek Reservoir, mentioned above, and the authorized North Oconee Upstream Watershed Project, will be considered for meeting these needs.

Jefferson. The Jefferson growth center experiences about $82,000 flood damage annually from the Middle Oconee River-Walnut Creek; however, it is expected that this authorized upstream watershed project by the U.S. Department of Agriculture will reduce this flood damage to a residual of about $4,000 per year, prior to 1980. The growth center will require about 4 million gallons of water per day, and about 2,000 acre-feet of water quality improvement flow per year. It is estimated that the increase in electrical energy requirements for this period will be 240 megawatt peak demand, and 1,330 gigawatt-hours of annual consumption.

Other Sub-regional Needs. The needs discussed in the paragraphs above are those that are identified with specific growth centers. It is estimated that water resource related needs that will occur in those portions of the sub-region that are not associated with specific growth centers discussed above will amount to about 779 mgd water supply; about 140,000 acre-feet per year for water quality improvement; for water-oriented recreation, 82.7 million recreation days per year; and an increase peak demand for electrical energy of 28.15 megawatts, with an increase in annual consumption of 155,230 gigawatt-hours. It is also estimated that about $745,000 worth of flood damage occurs in the areas outside specific growth centers each year. Portions of these needs will be satisfied by the projects that are being considered in connection with the specific growth centers described above.

11. NON-STRUCTURAL

An active program of flood plain information studies accompanied by flood plain zoning and management policies should accompany any structural water control plan.*/ Alert action based on sound hydrologic and hydraulic studies can guide the development potential, minimize the unwitting encroachment into areas of high risk flooding hazards and promote wise land use policies.

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*/ Such studies and policies are embodied in the National Flood Insurance Act of 1968, Title XIII of the Housing and Urban Development Act of 1968 (42 U.S.C. 4001 et seq. PL 90-448) and Executive Order 11296, August, 1966.

Non-structural means of minimizing water quality and quantity problems are important components of any effective water management plan. The combined Federal and State program for establishing and controlling water quality standards will contribute to the wise use of this resource. Technological improvements in treatment systems, in reuse or closed cycle process in industrial plants and other applications promise gains for both quality and quantity problems.

These and other relevant non-structural alternatives have been carefully considered in the development of the comprehensive water resource plan.

SECTION IV
EVOLUTION OF THE SUB-REGION WATER
RESOURCES DEVELOPMENT PLAN

12. SELECTION OF BEST SOLUTIONS

Water resource needs for the growth centers in Sub-region D have been described in Section II, and probable sources for meeting these needs described in Section III. Certain assumptions have been made in order to facilitate selection of the best apparent plan for the provision of these needs. These are: (1) development of presently authorized projects will continue; (2) water supply requirements sufficient to supply the 1980 needs will be proved or contracted for by states or municipalities prior to that time; and (3) minimum releases from all reservoirs would be equal to minimum inflow.*/ Existing authorized and potential projects whether developed by the Corps of Engineers, Department of Agriculture, state, city, or public utility have been considered. Non-structural alternatives have also been given consideration in the derivation of this plan.

Yadkin River Basin

There are three secondary and one major growth center in this basin as follows: Wilkesboro-North Wilkesboro; Elkin-Jonesville; Mount Airy; and Winston-Salem. The first three centers listed are classified as secondary, and will be discussed in the order listed above, which progresses downstream from the headwater reach (See Figure 8-5).

Wilkesboro-North Wilkesboro. A diagram showing the relative location of the growth center and the existing or potential units of development from which needs can be met is shown below. Flood control storage provided, water supply yield, water quality storage, expected to be available are shown thereon.

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*/ To meet riparian obligations. For purposes of this study we assumed that recorded minimum natural low flow would be available for use by all riparian owners.

W. Kerr Scott Reservoir (operating)
FC - 112,000 AF
W.S. (Gross) - 165 mgd (for Winston-Salem)
W.S. (Net) - 115 mgd

Min. Low Flow - 64 mgd

Reddies River Reservoir (authorized - assumed to be operable by 1980)
FC - 35,000 AF
W.S. (Gross) - 32 mgd
W.S. (Net) - 18 mgd
W.Q. - 12,000 AF

Reach A*

Estimate of Needs
Current Flood Damage - $1,000
Land Development - 300 acres (2020)
W.S. - 33 mgd (2020)
W.Q. - 3,000 AF (2020)

Wilkesboro-
North Wilkesboro

From Reach A
FC - 147,000 AF
W.S. (Net) - 115 + 18 = 133 mgd
Min. Low Flow - 57 mgd
W.Q. - 12,000 AF

* Reaches do not necessarily conform to flood damage zones.

The cities of Wilkesboro and North Wilkesboro are partially located in the flood plain of the Yadkin River and its left bank tributary, the Reddies River. A high degree of flood protection is furnished by the W. Kerr Scott Reservoir and with the authorized Reddies River Reservoir, the residual flood damage will be reduced to about $1,000 annually. Increase in this residual can be inhibited by providing flood plain information and planning for its use.

It is estimated that the needs for municipal and industrial water supply will increase from 10 million gallons per day in 1980 to 33 mgd by 2020. Water supply is now obtained by pumping from the Yadkin River. The minimum low flow of record in the Yadkin River is more than adequate to meet expected needs. Pumping plant capacity can be expanded as needed. Tentative storage allocations include 12,000 acre-feet of water quality storage in the Reddies River Reservoir for needs at Winston-Salem, which would more than meet the apparent needs at Wilkesboro-North Wilkesboro.

The two reservoirs, along with the minimum streamflow maintained, would provide for flood control land development and water needs of this growth area through the year 2020.

Elkin-Jonesville. The reach from below Wilkesboro-North Wilkesboro through Elkin-Jonesville has been designated as Reach "B." The diagram below summarizes water needs and alternatives available to meet the needs. Flood damages remaining, after the effects of W. Kerr Scott and Reddies River Reservoir are considered, amount to $54,000 annually. Land development needs are estimated to require 230 acres of flood plain lands for urban uses by 2020. About 48 mgd of water supply will be needed by 2020, and some 3,000 acre-feet of water quality storage.

The Roaring River Reservoir would reduce current flood damages from $54,000 to $30,000 annually in the flood damage reach containing Elkin-Jonesville and provide an adequate degree of protection to meet the land development needs of the growth center. Water supply and water quality storage allocation in the reservoir are included to help meet downstream needs, since available streamflow should satisfy expected water needs of this growth center.

From Reach A
FC - 147,000 AF
W.S. (Net) - 133 mgd
Min. Low Flow - 57 mgd
W.Q. - 12,000 AF

Roaring River Res. (potential)
FC - 48,200 AF
W.S. (Gross) - 34 mgd
W.S. (Net) - 16 mgd
W.Q. - 18,000 AF

Reach B

Estimate of Needs
Current Flood Damage - $ 54,000
Land Development - 230 acres (2020)
W.S. - 48 mgd (2020)
W.Q. - 3,000 AF (2020)

Elkin-Jonesville

From Reach B
FC - 147,200 AF
FC (Potential) 195,200 AF
W.S. (Net) - 149 mgd
Min Low Flow - 63 mgd
W.Q. - 30,000 AF

Mount Airy. The Mount Airy growth area, located on the Ararat River, a tributary of the Yadkin, is experiencing rapid growth. Flooding from the Ararat River and one of its tributaries, Stewart-Lovills Creek, will cause damage in the growth center amounting to about $11,000 annually when the Stewart-Lovills Creek upstream watershed development, now in progress by the Soil Conservation Service, is completed. This project will include four reservoirs, one of which will contain about 964 acre-feet for water supply storage with an estimated yield of 1 1/2 million gallons per day. This water storage is included for the use of Mount Airy. Assuming that the growth rate increases and parallels the rate established by the benchmark studies, it is expected that Mount Airy will require 9 million gallons of water per day in 1980, 19 million gallons per day by the year 2000, and 33 million gallons per day by the year 2020. The dependable yield of the present system is estimated to be about 12 million gallons per day, and this includes the yield from the Stewart-Lovills Creek. When the capacity of the existing system is reached, the supply can be supplemented by pumping directly from the Ararat River, which has a dependable low flow of about 14 million gallons per day.*/ Assuming that this dependable low flow could all be utilized, it will still be necessary to make other arrangements before the year 2020 if the economic growth is to continue in this area. It appears that the flood problems along the river will also require study since present estimates indicate that 790 acres of flood plain lands for various urban uses will be required prior to the year 2020. Plans for accomplishment of this study of survey scope should be made and initiated not later than the year 1990. Survey report studies should consider multiple purposes in order to fully develop the water resources for use of this area. The diagram on the following page shows a water balance for the reach of the Yadkin River opposite Mount Airy. This diagram indicates that some other source of water supply might be exploited. Fisher Reservoir, for example, is one source, as well as potential impoundment on the main-stem of the Ararat River, which could also provide flood protection and water quality control for the growth center.

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*/ Based on a very short period of record.

Reach C

From Reach B
FC - 147,000 AF
FC - 195,000 AF (potential)
W.S. (Net) - 149 mgd
Min. Low Flow - 63 mgd
W.Q. - 30,000 AF (Uncommitted)

Min. Flow - 12 mgd

Mitchell River Res. (potential)
FC - 28,750 AF
W.S. (Gross) - 30 mgd
W.S. - (Net) - 18 mgd
W.Q. - 5,000 AF

Min. Flow - 9 mgd

Fisher River Res. (potential)
FC - 63,000 AF
W.S. (Gross) - 80 mgd
W.S. (Net) - 71 mgd

Stewart-Lovills Creek

Mt. Airy*

Stewart-Lovills Creek WS (USDA) (under const.)
4 reservoirs (1-MP)
FC - 12,500 AF
W.S. - 964 AF
(1.5 mgd est.)

Ararat River

Min. Flow-14 mgd**

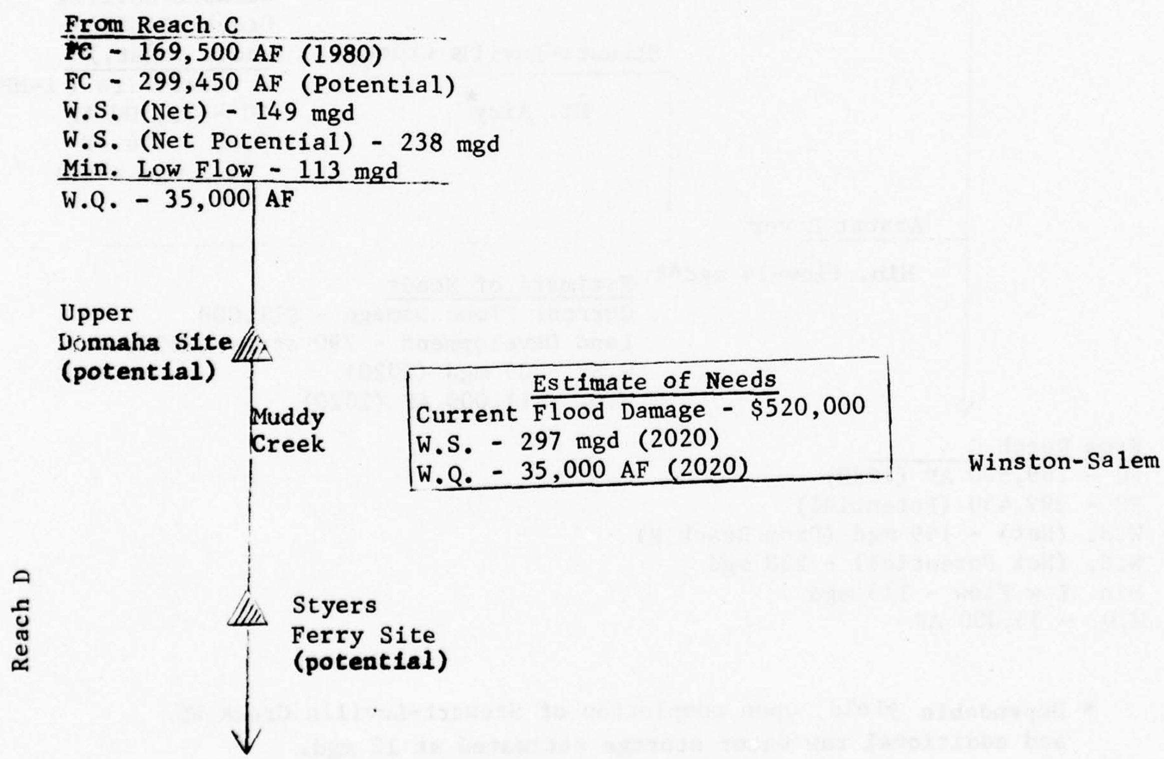
Estimate of Needs
Current Flood Damage - $11,000
Land Development - 790 acres (2020)
W.S. - 33 mgd (2020)
W.Q. - 11,000 AF (2020)

From Reach C
FC - 169,500 AF (1980)
FC - 299,450 (Potential)
W.S. (Net) - 149 mgd (From Reach B)
W.S. (Net Potential) - 238 mgd
Min. Low Flow - 113 mgd
W.Q. - 35,000 AF

* Dependable yield, upon completion of Stewart-Lovills Creek WS and additional raw water storage estimated at 12 mgd.

** Only one year record at gage.

Winston-Salem. The estimated available water supply, future needs, and water problems for the Winston-Salem growth area are presented on the following diagram. Assuming that the econom ic growth and the accompanying population increase for the Winston-Salem growth area continues to grow at the rates indicated in the benchmark studies, this growth center will require about 83 million gallons per day of water supply by the year 1980, 170 million gallons per day by the year 2000, and 297 million gallons per day by the year 2020. The growth center experiences annual flood damage of about $20,000 from several small tributaries of the Yadkin River. Flood plain information studies have been completed for these creeks and are available for the use of the local planning authorities. However, since space to expand is generally at a premium in these areas, and it is estimated that about 580 acres will be required by the year 2020, it appears that measures for the elimination of flood damage from these creeks in the Winston-Salem growth center should be studied.



The City of Winston-Salem obtains its water supply by pumping directly from the Yadkin River which has a dependable flow, at this point, of 113 mgd. In addition, the city also has water supply storage in the W. Kerr Scott Reservoir that will provide an additional 115 mgd, making a total of 228 mgd available for present use. It is estimated that this will provide for the growth center needs until about 2010. Additional water supply storage can be available in both Reddies and Roaring River Reservoirs. Reddies Reservoir will yield about 18 mgd, and Roaring Reservoir about 16 mgd, a total for the two of 34 mgd. If this yield is made available for Winston-Salem, its water supply needs will be met until about 2015.

There are other potential reservoir sites in the basin that could also be developed if the full potential of the basin is to be realized. Sites on Mitchell and Fisher Rivers and on the main stem at Upper Donaha and Styers Ferry could provide water for: export from the basin; for quality control; hydroelectric power generation; cooling water; and recreation, in addition to flood control.

It is probable that cities outside the basin, Greensboro and High Point, for example, may require a substantial additional supply of water, part of which may be economically transferred from the Yadkin River. A plan for development of a "Seven Cities Water Project" was prepared by Piatt and Davis of Durham, North Carolina, William C. Olsen and Associates of Raleigh, North Carolina, and Hazen and Sawyer, New York, New York. The seven cities that would be served are Burlington, High Point, Greensboro, Kernersville, Lexington, Thomasville, and Winston-Salem, North Carolina. This plan envisioned using the Yadkin River as a source of supply.

<u>Other</u>. The analysis in the preceding paragraph applies only to the problems associated with the growth centers that have been identified in the various economic studies. There are, however, problems of flood damage and inadequate water supply in other communities in the basin which are not now identified as growth centers. The establishment of rural water districts will create many demands for public water supply. Many of these needs can be met by the inclusion of multiple-purpose reservoirs in the plans for upstream watershed development as formulated by the Soil Conservation Service in their P.L. 566 project studies. Supplies for many of the small towns can also be provided by these projects. A work plan has been developed for the South Yadkin River that will provide for four towns in Iredell and Alexander Counties.

Other upstream watershed projects in operation and underway in the Upper Yadkin Basin include (See Figure 8-5):

Location Number	Name of Waterway	State
2	Deep-Creek Watershed	North Carolina
9	Dutchman Creek Watershed	North Carolina
12	Little Yadkin River	North Carolina

Upstream watershed projects available for planning include:

Location Number	Name of Waterway	State
15	Turner Creek	North Carolina
17	Hunting Bear Creek	North Carolina
19	South Yadkin	North Carolina

The Turner Creek Watershed Project would provide flood protection to an area which would be included in the pool of the potential Styers Ferry Reservoir Project. However, in view of the uncertainty regarding definite recommendations for construction of Styers Ferry Reservoir, the Turner Creek Project should be implemented under PL-566 criteria, assuming local interests supply necessary assurances. If the Styers Ferry Reservoir should be recommended in some subsequent study, the benefits foregone in the Turner Creek Project should be assumed as a cost of the Styers Ferry Project.

The South Yadkin Watershed proposal appears to be justified under PL-566 criteria and will meet a water supply need of over 1 mgd at Mocksville, North Carolina. The project should be implemented under current procedures.

Recreation and electric power requirements will be discussed on a sub-regional basis.

Basin Plan. The recommended plan of development of water resources in the Yadkin River Basin portion of Appalachia would include the following:

Projects in Operation or Expected to be in Place by 1980:

Corps of Engineers

W. Kerr Scott Reservoir, North Carolina
Reddies River Reservoir, North Carolina

USDA Upstream Watershed Projects

Deep Creek
Dutchman Creek
Little Yadkin River
Stewarts-Lovill Creek
Abbotts Creek
Town Fork Creek

For Authorization:

Corps of Engineers

Roaring River Reservoir, North Carolina

For Continuing Planning:

USDA Watershed Projects

Turner Creek
Hunting Bear Creek
South Yadkin

Non-Structural

Flood Plain Information Studies at:

Wilkesboro-North Wilkesboro
Mt. Airy

Future Studies

Study of the Yadkin River, oriented towards development of the middle portion of the river, with emphasis on water supply and quality problems in the Mount Airy and Winston-Salem, and water supply for the Greenville and High Point areas, out of the basin, the recreation and power potential needs of the area, and flood damage prevention in the Elkin-Jonesville reach.

Table 8-11 shows the effectiveness of the selected plan in satisfying the flood control, water supply, and water quality control problems of the growth centers. A map and schematic diagram of the various alternatives considered is shown on Figure 8-5.

TABLE 8-11. EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN UPPER YADKIN RIVER BASIN, SUB-REGION D

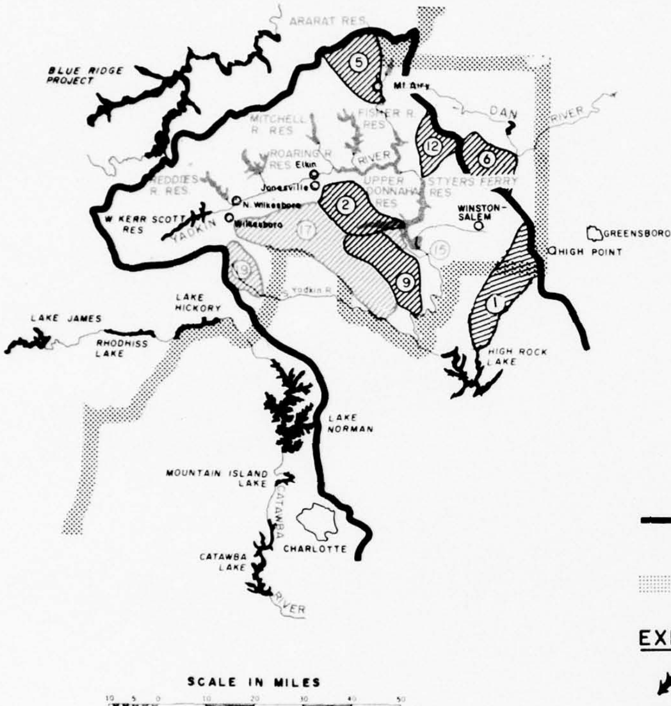
ITEM	NEEDS[a/]	OUTPUT OF ALTERNATIVE PROJECTS Roaring River Res. (CE)	Mitchell River Res. (CE)	Fischer River Res. (CE)	UNMET NEEDS	INDICATED FUTURE STUDIES
Water Supply	(mgd)					
Mt. Airy	21				21	Upstream Reservoir(s)
Winston-Salem	35	16	18	71	--	
Water Quality	(1000 AF)					
Elkin-Jonesville	3	3				
Mt. Airy	11				11	Upstream Reservoir(s), Advanced Treatment
Winston-Salem	23	18	5[b/]			
Flood Control (Current damage)	($1000)					
Wilkesboro-N. Wilkesboro	1				1	Flood Plain Management
Elkin-Jonesville	54	24			30	Local Flood Protection; Flood Plain Management
Mt. Airy	11				11	Upstream Reservoir(s); Flood Plain Management
Winston-Salem	20				20	Small Flood Control Project; Flood Plain Management
Flood Control (Future urban land use in flood plain - acres)						
Wilkesboro-N. Wilkesboro	--				--	
Elkin-Jonesville	146	30			116	
Mt. Airy	790				790	Upstream Reservoir(s); Flood Plain Management
Winston-Salem	580				580	Small Flood Control Project; Flood Plain Management
Recreation Days (1000's)	18,130	180	140	250	17,560	Mainstem Reservoir(s)
Power (Peak demand - Gigawatts)	12.64				12.64	Mainstem Reservoir(s)
Performance Index #1[c/]		1.4	1.1	1.7		
Performance Index #2[c/]		10.4	2.4	2.5		

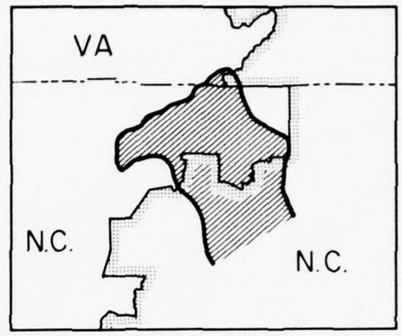
a/ Assuming W. Kerr Scott and Reddies River Reservoirs operating.

b/ May be reallocated to Reddies and Roaring in AE&D.

c/ Performance Index #1 - $\frac{\text{User and Redevelopment Benefits}}{\text{Project Costs}}$

Performance Index #2 - $\frac{\text{Regional Income Gains}}{\text{Total Costs}}$





VICINITY MAP

LEGEND

UPPER YADKIN BASIN BOUNDARY

APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

UPSTREAM WATERSHED PROJECT IDENTIFICATION

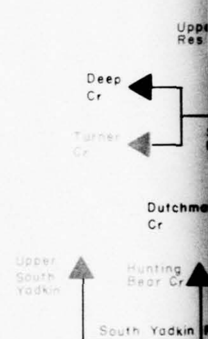
EXPECTED TO EXIST BY 1980
- 1 Abbotts Creek
- 2 Deep Creek
- 5 Stewarts - Lovills Creek
- 9 Dutchman Creek
- 12 Little Yadkin River
- 6 Town Fork Creek

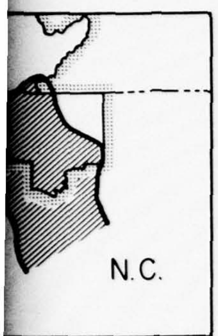
ALTERNATIVES AVAILABLE FOR PLANNING
- 15 Turner Creek
- 17 Hunting Bear Creek
- 19 Upper South Yadkin

UPPER YADKIN RIVER BASIN

VIRGINIA AND NORTH CAROLINA

ALTERNATIVES LOCATION MAP



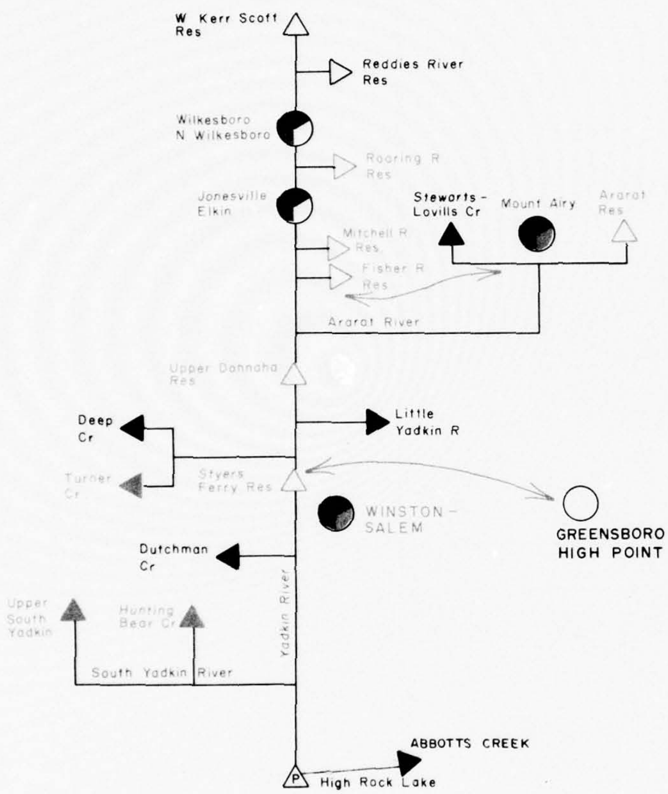


TY MAP

OUNDARY

PROJECT

PROJECT



LEGEND

NEEDS

WATER QUALITY

WATER SUPPLY

FLOOD CONTROL

ALTERNATIVES

EXPECTED TO EXIST BY 1980:

MAJOR RESERVOIR; P INDICATES NON-FEDERAL OWNER

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES:

MAJOR RESERVOIR: P-PRIVATE

UPSTREAM WATERSHED PROJECT

TRANS-BASIN DIVERSION

OTHER

TOWN NAME PRIMARY GROWTH CENTER

Town Name SECONDARY GROWTH CENTER

DKIN
ASIN
H CAROLINA

TIVES
N MAP

UPPER YADKIN
RIVER BASIN

VIRGINIA AND NORTH CAROLINA

SCHEMATIC OF WATER NEEDS
AND
ALTERNATIVE SOLUTIONS

 FIGURE 8-5

2

Catawba River Basin

There are three growth centers in the Catawba River Basin, all classified as secondary (See Figure 8-6). They are: Lenoir, Morganton, and Marion, North Carolina. Discussion will be in the order listed:

Lenoir, North Carolina. Water needs of the Lenoir, North Carolina growth center are relatively small. About 260 acres of flood plain land are anticipated to be needed for urban uses. Flood plain management, based on flood plain information studies, should be utilized to guide development of flood plain lands.

Morganton, North Carolina. Water needs of the Morganton, North Carolina growth center include 370 acres of flood plain land anticipated to be needed for urban uses by 2020 and about 11,000 acre-feet of water quality storage. There is a possibility that the upstream power reservoirs do not have sufficient storage space to accommodate less frequent floods; therefore, the flooding hazard should be studied to define the seriousness of the problem. Flood plain management, based on flood plain information studies, should provide for land development needs in the flood plain, while release for power from the upstream reservoirs will probably meet water quality problems that may develop.

Marion, North Carolina. The Marion, North Carolina growth center has needs for water resource development of about 200 acres of flood plain land to be utilized for urban uses by 2020, and about 7,000 acre-feet of water quality storage. Flood plain management, based on good flood plain information, should guide the development of flood plain lands.

Basin Plan. The plan of development of water resources in the Upper Catawba River Basin includes the following:

Projects in Operation or Expected to be in Place by 1980:

Duke Power Company

Lake James
Rhodiss Lake
Lake Hickory
Lookout Pond

USDA Upstream Watershed Projects

Muddy Creek

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For Continuing Planning:

<u>Future Studies</u>

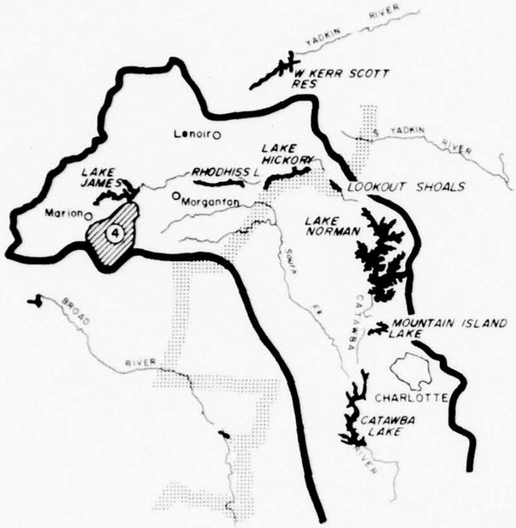
Flood Plain Information Studies at:

Lenoir, North Carolina
Marion, North Carolina
Reconnaissance study for potential flooding at
Morganton, North Carolina

A basin map and schematic of the Catawba River Basin is presented on Figure 8-6, while Table 8-12 presents a summary of the output of alternative potential projects.

TABLE 8-12. EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN CATAWBA RIVER BASIN, SUB-REGION D

ITEM	NEEDS	OUTPUT OF ALTERNATIVES CONSIDERED	UNMET NEEDS	INDICATED FUTURE STUDIES
Water Quality	(1000 AF)			
Lenoir	8	--	8	Water Quality Management; Effect of Power Releases
Morganton	11	--	11	
Marion	7	--	7	
Flood Control (Current damage)	($1000)			
Morganton	Undefined	--	Undefined	Reconnaissance Report; Flood Plain Management
Flood Control (Future urban land use in flood plain - acres)				
Lenoir	260	--	260	Flood Plain Management
Morganton	370	--	370	
Marion	200	--	200	
Recreation (1,000 Recreation Days)	5,900	--	5,900	
Power (Peak demand, Gigawatts)	4.91	--	4.91	
Performance Index #1				
Performance Index #2				



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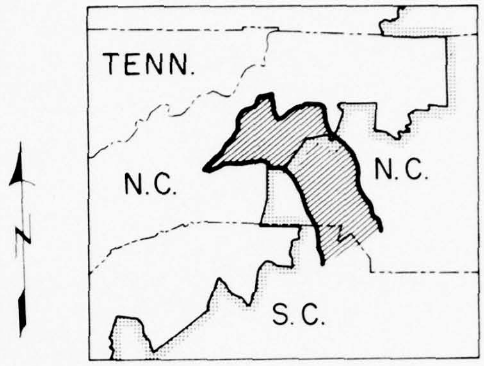


VICINITY MAP

LEGEND

BOUNDARY

APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

UPSTREAM WATERSHED PROJECT IDENTIFICATION

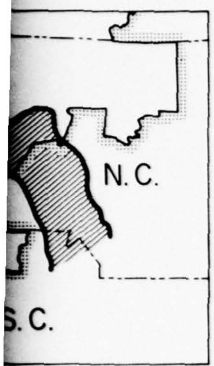
EXPECTED TO EXIST BY 1980

4 Muddy Creek

CATAWBA
RIVER BASIN

NORTH AND SOUTH CAROLINA

ALTERNATIVES LOCATION MAP

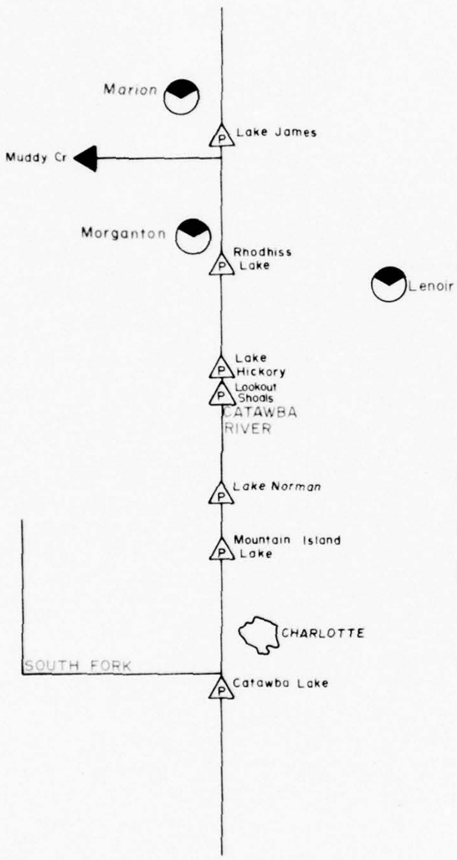


TY MAP

UNDARY

PROJECT

BA
ASIN
H CAROLINA
TIVES
N MAP



LEGEND

NEEDS

WATER QUALITY

ALTERNATIVES

EXPECTED TO EXIST BY 1980:

△ MAJOR RESERVOIR; P INDICATES NON-FEDERAL OWNER

▲ UPSTREAM WATERSHED PROJECT

OTHER

Town Name SECONDARY GROWTH CENTER

CATAWBA
RIVER BASIN

NORTH AND SOUTH CAROLINA

SCHEMATIC OF WATER NEEDS
AND
ALTERNATIVE SOLUTIONS

 FIGURE 8-6

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Broad and Saluda River Basins

Since the Saluda River is a tributary of the Broad River and the problems of development are common to both, this area will be treated as a unit (See Figure 8-7). There is one secondary growth center, the Rutherfordton-Spindale-Forest City, and two that are classified as primary. The primary centers are Easley-Greenville-Spartanburg and Gaffney. The secondary growth center is in North Carolina, the two primary centers are both in South Carolina.

Rutherfordton-Spindale-Forest City. The Rutherfordton-Spindale-Forest City growth center in North Carolina lies in the Broad River Basin between the Broad River and a left bank tributary, the Second Broad River. Flooding problems are localized and are primarily due to short period flooding from small streams. Water supply for this complex is furnished by Spindale and is taken from the Second Broad River. It is expected that water use will reach 8 mgd by 1980, 15 mgd by 2000, and 27 mgd by 2020. The minimum low flow to be expected in the Second Broad River is adequate for these needs. Some regulation of the Broad River is provided by upstream power reservoirs and will probably meet the water quality requirements. The potential Clinchfield Reservoir could provide some very attractive industrial sites along the reservoir and should meet the land development needs and opportunities very satisfactorily.

Easley-Greenville-Spartanburg, South Carolina. The Easley-Greenville-Spartanburg, South Carolina growth center lies across the basins; the streams on which these cities are located have very limited capability for being developed to alleviate flood damages and to meet water supply and water quality flow requirements. For this reason, interbasin transfers appear imminent. Flooding problems within the growth center approximate $380,000 annually under current conditions. With installation of George's Creek Upstream Watershed Project and the Reedy River Local Protection Project, annual damages under current conditions would be reduced to $76,000. A need for about 1,560 acres of flood plain lands to be utilized for urban purposes is anticipated by 2020. About 291 million gallons per day of additional water supply will be needed by 2020, and 132,000 acre-feet of water quality storage above the point of need.

Some additional water supply can be developed in the upstream watershed projects that have been studied for the North and Middle Tyger and South Pacolet Rivers. The flood reduction that would be afforded by these improvements would help provide a portion of the 1,560 acres mentioned in the preceeding paragraph. The major source of water for municipal, industrial, and quality improvements is the Clinchfield Reservoir, now being studied for potential development on the Broad River just above the North-South Carolina line. This reservoir can be developed to furnish 413 mgd. A conveyance facility would be required to move the water into the Spartanburg-Greenville areas. Another potential source of supply for the Easley-Greenville area is the Keowee-Toxaway Project being developed on the Savannah River by the Duke Power Company.

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Gaffney. The Gaffney, South Carolina growth center has current flooding damages of about \$12,000 annually and needs for about 60 acres of flood plain land for urban uses by 2020. Additional needs by 2020 for water quality are estimated to be 6 mgd and about 6,000 acre-feet of water quality storage will be needed.

Because of the large requirement for water supply and water quality in the Broad and Saluda River Basins, and the location of the needs so far upstream, the Clinchfield Reservoir site on the Broad River appears to be an alternative which efficiently meets the needs for additional water supply and water quality across a large area of the upper portion of the basins. The schematic and basin map shown on Figure 8-7 portrays the growth centers, location of needs, location of alternatives, and operating projects. Table 8-13 presents the output of potential alternatives. The following discussion evaluates these broad needs across the basins and develops a plan of water resource development to meet the needs.

Basin Plan. The flooding problems at Rutherfordton, Spindale and Forest City, North Carolina can be met by means of small upstream watershed flood protection projects and flood plain management. The available supply of water appears to be adequate to meet all foreseen water supply needs although the potential Camp-Cane Creeks Upstream Watershed Project can be expanded to increase dependable streamflow in the area downstream from the project along the Second Broad River. The potential Clinchfield Reservoir would also prove to be a source of additional water if an unanticipated large user should want to locate within this growth center. The reservoir could provide a very attractive and well-located site for industrial development. The needs for water quality storage are not met by any of the alternative projects considered for this report. Further studies would be required to more definitely establish the critical stream reaches and to determine whether advanced treatment would be a relevant alternative, or if location of treated but heavy effluent discharges can be guided to streams with adequate assimilative capacity.

The residual flooding damages and the land development needs at Gaffney could be met by small flood control projects and flood plain management. The potential Cherokee Creek Watershed Project can economically meet the anticipated water supply needs of the growth center while water quality dilution flows can be met by the potential Clinchfield Reservoir Project.

Major needs for water supply and water quality are anticipated in the Easley-Greenville-Spartanburg growth area. The magnitude of the needs indicates the possible advantage of developing a major reservoir as a source. One of the alternatives among major reservoirs would be to obtain water from the Keowee-Toxaway Project under construction by Duke Power Company. This option has been advanced to the City of Greenville in a recent engineering proposal. The proposal includes treatment facilities at the reservoir and distribution of treated water to Greenville at an estimated cost of about \$27.7 million dollars. One of the constraints on this option is that the FPC license for Keowee-

Toxaway requires sale of water from the project as opposed to Duke's current policy of providing water at no cost to municipalities upon request. The cost of water from Keowee-Toxaway has not been determined, but adverse effects on power generation, from reduced flow and head and from reduced availability of cooling water, could become significant if large withdrawals are anticipated.

The potential Clinchfield Reservoir can easily meet all the water supply needs anticipated for the growth area and if an area-wide conveyance system is provided, meet needs outside the growth area economically. The potential South Pacolet River Upstream Watershed can increase the dependable flows of the reservoirs currently supplying Spartanburg's water needs and could be implemented as an interim improvement by the municipality. Clinchfield Reservoir can meet the water quality needs identified on the Broad River by direct releases.

Further investigation of potential reservoir sites in the Upper Saluda Basin should be pursued to reduce residual flooding, provide additional dilution flows and for water supply. A coordinated study of the potential for diverting water quality flows across the basin in a joint use conveyance facility from Clinchfield Reservoir may indicate that this is more effective and economical than the development of upstream reservoirs. Thus, a complete study of diversion of water from Clinchfield Reservoir and/or from Keowee-Toxaway, along with various systems of upstream reservoirs in degrees of advanced treatment, needs to be made to resolve a joint water supply and water quality problems. Flooding problems and land development needs can be met by local protection, upstream reservoirs, and/or various flood plain management options.

The investigation of the Clinchfield Reservoir site has progressed to the point that a definite recommendation for authorization can be made. The yield capability, flood damage reduction, water quality potential and recreation potential of the reservoir indicate a highly favorable user benefit to cost ratio. Assurances for provision of non-federal cost sharing are positive and supported by both North and South Carolina. Thus, authorization of the Clinchfield Reservoir Project now and initiation of the comprehensive study of the Upper Saluda Basin to resolve the flooding problems, with an analysis of the most favorable means for conveyance from Clinchfield and/or Keowee-Toxaway is recommended. A feasible means for implementing the conveyance proposal should be evaluated, which includes the aspect of interbasin and interstate transfers of water along with the formation of favorable institutional arrangements for financing and administration.

A Summary of the Basin Plan for the Broad and Saluda River:

Projects in Operation or Expected to be in Place by 1980:

Corps of Engineers

Reedy River Local Protection Project at Greenville, South Carolina

USDA Upstream Watersheds

Brushy Creek
Big Creek
Broad Mouth Creek
Huff Creek
Thicketty Creek
George's Creek
South Tyger River

For Authorization:

Corps of Engineers

Clinchfield Reservoir

USDA Upstream Watershed Projects For Early Action:

Cherokee Creek
South Pacolet River
Oolenoy River

For Continuing Planning:

Future Studies

Study of the Upper Saluda Basin to resolve flooding, water supply, water quality and recreation problems with an analysis of the most favorable means of conveyance of water from Clinchfield Reservoir and/or Keowee-Toxaway Project to meet water quality and quality needs at Greenville and Spartanburg.

Flood Plain Information Studies at:

Greenville, South Carolina
Spartanburg, South Carolina
Easley, South Carolina
Rutherfordton, North Carolina
Spindale, North Carolina
Forest City, North Carolina

Reconnaissance Study of Flooding at Spartanburg, S.C.

USDA Watersheds at:

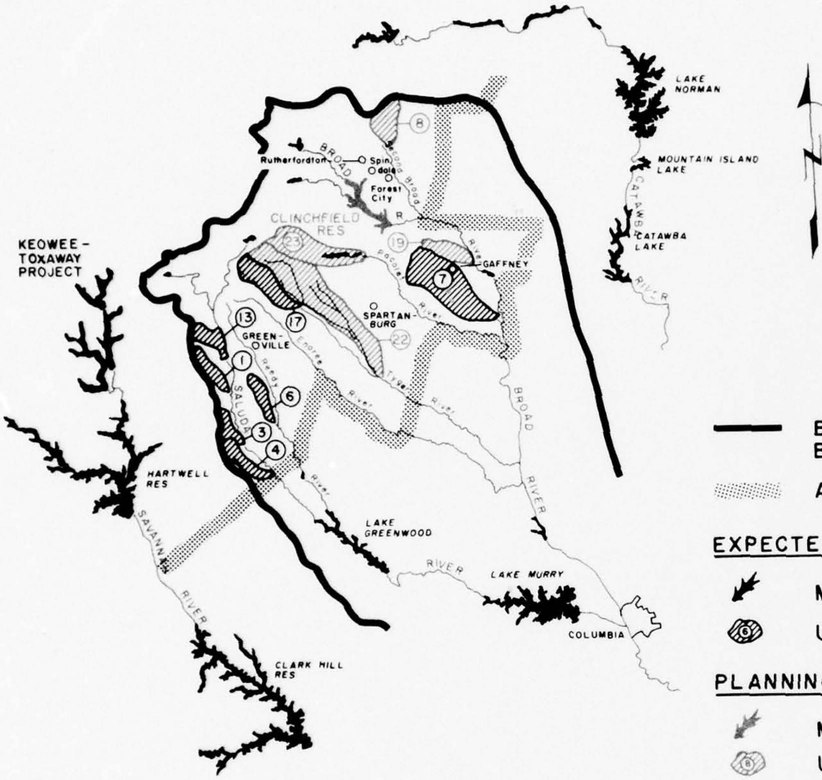
(Second Broad River Camp includes Cane Creek)
North & Middle Tyger River

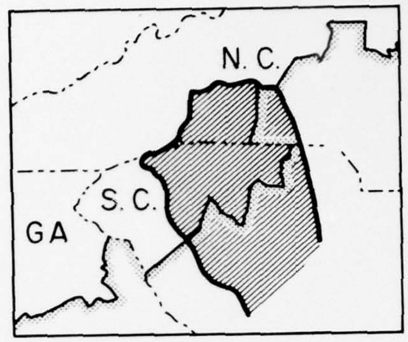
TABLE 8-13. EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN BROAD AND SALUDA RIVER BASINS, SUB-REGION D

ITEM	NEEDS	OUTPUT OF ALTERNATIVE PROJECTS: Clinchfield Res. (CE)	South Pacolet River WS (USDA)	N. & Middle Tyger River WS (USDA)	Cherokee Cr. WS (USDA)	UNMET NEEDS	INDICATED FUTURE STUDIES
Water Supply	(mgd)						
Gaffney, S.C.	6	--	--	--	6	--	Source at Keowee-Toxaway
Easley-Greenville-Spartanburg, S.C.	291	443	12	--	--	--	Conveyance facilities, incl. alternative
Water Quality	(1000 AF)						
Rutherfordton-Spindale-Forest City, N.C.	9	--	--	--	--	9	
Gaffney, S.C.	6	6	--	--	--	0	
Easley-Greenville-Spartanburg, S.C.	132	90	--	--	--	42	Compre. Survey of Upper Saluda Rvr. Basin
Flood Control (Current damage)	($1000)						
Rutherfordton-Spindale-Forest City, N.C.	5	--	--	--	--	5	Small Fl. Con. Proj., Flood Plain Mgt.
Gaffney, S.C.	12	--	--	--	4	8	Small Fl. Con. Proj., Flood Plain Mgt.
Easley-Greenville-Spartanburg, S.C.	76 a/	--	14	25	--	37 b/	
Flood Control (Future urban land use in flood plain - acres)							
Rutherfordton-Spindale-Forest City, N.C.	290	--	--	--	--	290	Small Fl. Con. Proj., Flood Plain Mgt.
Gaffney, S.C.	60	--	--	--	--	60	Small Fl. Con. Proj., Flood Plain Mgt.
Easley-Greenville-Spartanburg, S.C.	1,560	--	--	--	--	1,560	Recon. Rpt. at Spartanburg; Fl. Pl. Mgt.
Recreation Days (1000's)	19,300	5,700	105	92	16	13,387	Upper Saluda River Basin Study
Power (Peak demand, Gigawatts)	13.22	--	--	--	--	13.22	
Performance Index #1		2.8	1.8	1.2	2.8		
Performance Index #2		13.4	2.0	1.3	2.8		

a/ Assuming Reedy River Project is implemented.

b/ Reconnaissance Report at Spartanburg;
Upper Saluda River Basin Study
Flood Plain Management





VICINITY MAP

LEGEND

BROAD AND SALUDA RIVER BASINS BOUNDARY

APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

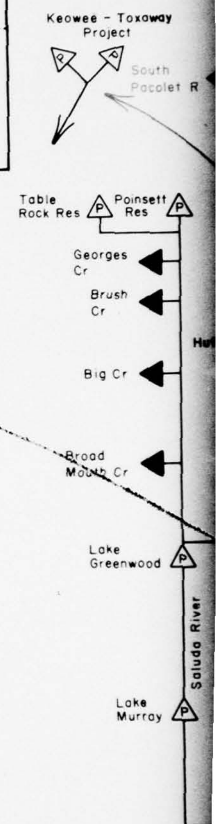
MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT



UPSTREAM WATERSHED PROJECT IDENTIFICATION

SCALE IN MILES

10 5 0 10 20 30 40 50

EXPECTED TO EXIST BY 1980

1 BrushyCreek
3 Big Creek
4 Broad Mouth Creek
6 Huff Creek
7 Thicketty Creek
13 Georges Creek
17 South Tyger River

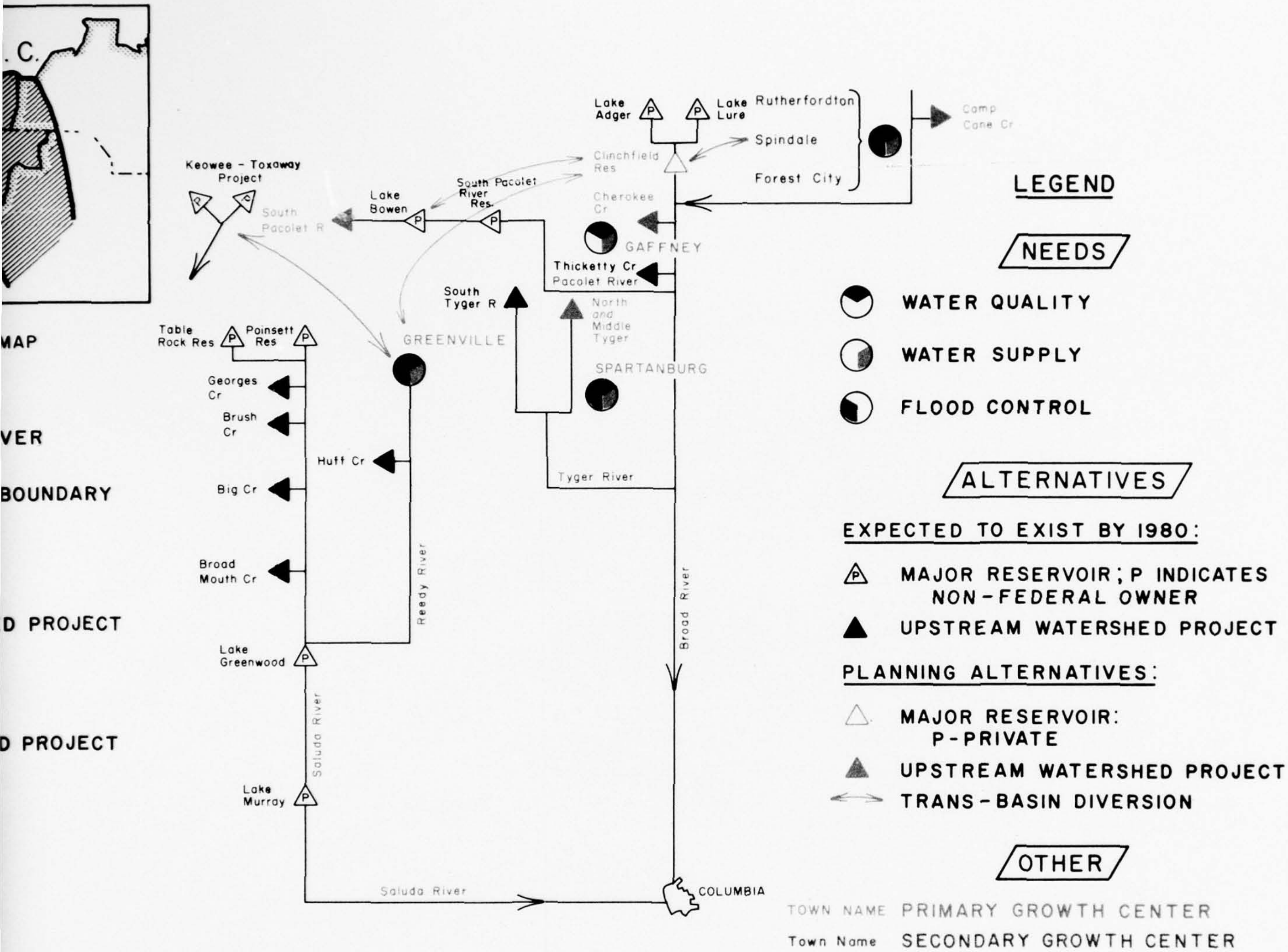
ALTERNATIVES AVAILABLE FOR PLANNING

8 Camp-Cane Creek (Second Broad River)
19 Cherokee Creek
22 North and Middle Tyger
23 South Pacolet River

BROAD AND SALUDA RIVER BASINS

NORTH AND SOUTH CAROLINA

ALTERNATIVES LOCATION MAP



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MAP

BROAD AND SALUDA
RIVER BASINS

NORTH AND SOUTH CAROLINA

SCHEMATIC OF WATER NEEDS AND ALTERNATIVE SOLUTIONS

 FIGURE 8-7

2

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Savannah River Basin

A basin river map and schematic of the Savannah River Basin is presented on Figure 8-8, and Table 8-14 presents the summary of the output of alternative potential projects.

Seneca-Central-Liberty, South Carolina. Water needs for the Seneca-Central-Liberty, South Carolina growth center amount to $26,000 in annual flood damages (current), a need for about 30 acres in the flood plain to be used for urban purposes by 2020, a 2020 need of about 10,000 acre-feet water quality storage and 22 mgd of water supply. The potential Eighteen Mile Creek Upstream Watershed would reduce flooding damages to $5,000 annually; could provide 3.5 mgd of water supply to Central, South Carolina and has a potential for the development of about 10,000 acre-feet of water quality storage. Additional water supply should be available from the Hartwell Reservoir. Further studies of the water quality problem should be made to consider the effects of Keowee-Toxaway Project on the stream regimen since releases made for power purposes may also ameliorate water quality problems on the main stem. Flood plain management, based on good flood plain information, should provide for additional land needs and inhibit the growth in flooding damages in the urban areas.

Anderson-Belton. The Anderson-Belton growth center need for flood control is low due to rather limited flooding ($1,000 annually at present), but has a need for about 60 acres of flood plain lands to be utilized for urban purposes by 2020, and a 2020 need for about 55 mgd water supply, and 25,000 acre-feet of water quality storage.

Adequate water supply should be available from the Hartwell Reservoir and future studies are needed to define more precisely the alternatives for water quality management. Flooding and future urban land needs in the flood plain should be resolved by flood plain management based on good flood plain information. Over 7 million days of outdoor recreation opportunity will be needed by 2020 in the Appalachia portion in the Savannah River Basin. The potential for further development of Hartwell Reservoir and Keowee-Toxaway is under consideration by the Appalachian Regional Commission in the Appalachian Highlands Study.

Basin Plan. The plan of development for the Savannah River Basin includes the following components:

Projects in Operation or Expected to be in Place by 1980:

Corps of Engineers

Hartwell Reservoir
Trotters Shoals

Duke Power Company

Keowee-Toxaway Project

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USDA Upstream Watersheds

Twelve Mile Creek
Coneros Creek
Three and Twenty Mile Creek
Wilson Creek
Grove River
Middle Fork Broad River
North Fork Broad River
North Broad River
South Fork Broad River
South River
Hudson River

USDA Upstream Watersheds For Early Action:

Eighteen Mile Creek

For Continuing Planning:

Corps of Engineers

Water Quality Management in the Upper Savannah Basin

Flood Plain Information Studies at:

Seneca, South Carolina
Liberty, South Carolina
Central, South Carolina
Anderson, South Carolina
Belton, South Carolina

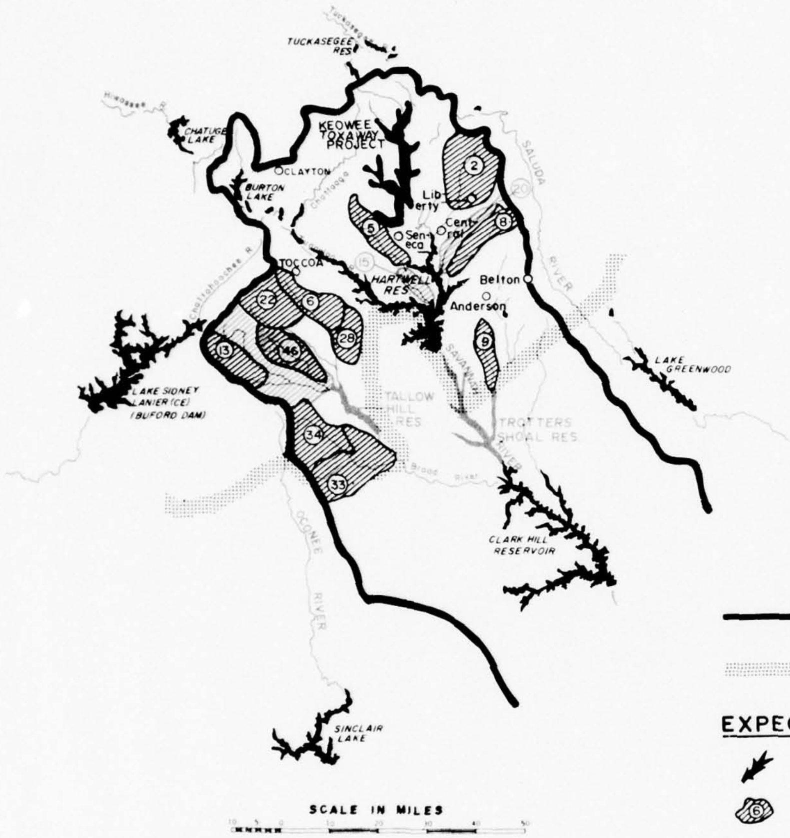
Multiple Purpose Reservoir at Tallow Hill.

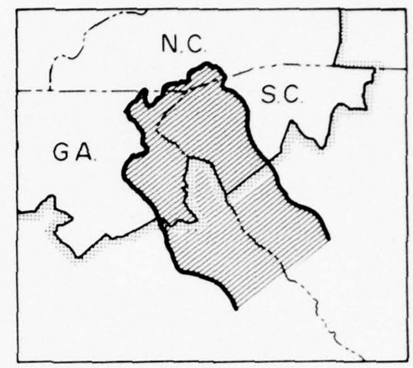
USDA Upstream Watershed Projects

Little Beaver Dam

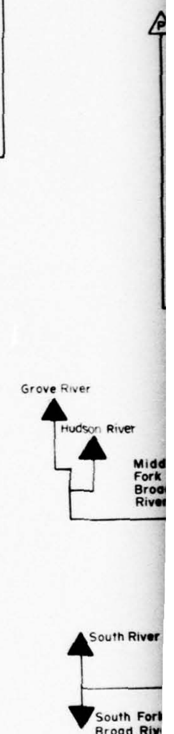
TABLE 8-14. EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN SAVANNAH RIVER BASIN, SUB-REGION D

ITEM	NEEDS	OUTPUT OF ALTERNATIVE PROJECTS Beaver-Dam Creek WS (USDA)	Eighteen-Mile Creek WS (USDA)	UNMET NEEDS	INDICATED FUTURE STUDIES
Water Supply	(mgd)				
Seneca-Central-Liberty	22		4	18	
Anderson-Belton	55			55	Diversion from Hartwell Reservoir (CE)
Water Quality	(1000 AF)				
Seneca-Central-Liberty	10			10	
Anderson-Belton	25			25	Water Quality Study
Flood Control (Current Damage)	($1000)				
Seneca-Central-Liberty	26		21	5	
Anderson-Belton	1			1	Flood Plain Management
Flood Control (Future urban land use in flood plain - acres)					
Seneca-Central-Liberty	30			30	Flood Plain Management
Anderson-Belton	60			60	Flood Plain Management
Recreation Days (1000's)	7,700	8	68	7,624	Development of Recreation Potential of Keowee-Toxaway Project
Power (Peak demand, Gigawatts)	5.17			5.17	
Performance Index #1		1.6	1.6		
Performance Index #2		1.6	1.6		





VICINITY MAP



LEGEND

SAVANNAH RIVER BASIN BOUNDARY

APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

UPSTREAM WATERSHED PROJECT IDENTIFICATION

EXPECTED TO EXIST BY 1980

2	Twelve Mile Creek
5	Coneross Creek
6	North Fork Broad River
8	Three and Twenty Mile Creek
9	Wilson Creek
13	Grove River
22	Middle Fork Broad River
28	North Broad River
33	South Fork Broad River
34	South River
46	Hudson River

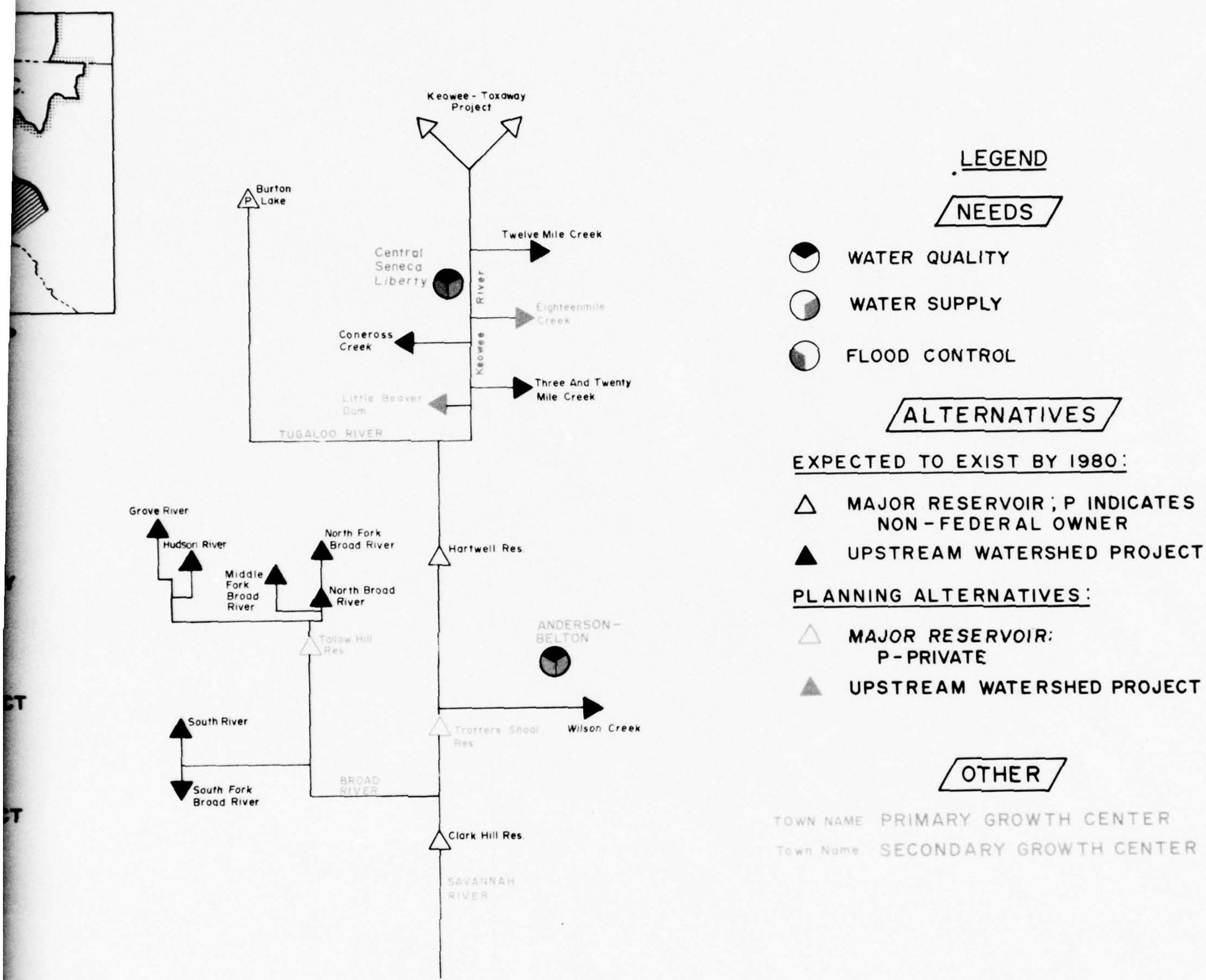
ALTERNATIVES AVAILABLE FOR PLANNING

15	Little Beaver Dam
20	Eighteen-Mile Creek

SAVANNAH RIVER BASIN

NORTH AND SOUTH CAROLINA AND GEORGIA

ALTERNATIVES LOCATION MAP



SAVANNAH RIVER BASIN

NORTH AND SOUTH CAROLINA AND GEORGIA

SCHEMATIC OF WATER NEEDS AND ALTERNATIVE SOLUTIONS

II-8-75 FIGURE 8-8

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Oconee River Basin

A river basin map and schematic of the Oconee River Basin is presented on Figure 8-9 while Table 8-15 presents a summary of the output of alternative potential projects.

Commerce, Georgia. The Commerce, Georgia growth center has water needs related to the development of about 60 acres of flood plain lands for urban uses by 2020, about 5 mgd water supply and about 2,000 acre-feet of water quality storage.

The potential North Oconee River Upstream Watershed Project could provide about 300,000 gallons per day of water supply while the additional need for water supply can be met by the potential Curry Creek Reservoir. Flood plain management based on good flood plain information should provide the land needed.

Athens, Georgia. The Athens, Georgia growth center dominates the needs for water resource development in the upper Oconee River Basin. The Athens area has about $91,000 annual flood damages at the present; a need for about 50 mgd of water supply; 17,000 acre-feet of water quality control storage and about 510 acres of flood plain land for urban users by 2020.

The potential Curry Creek Reservoir was formulated to meet this order of needs, as well as to meet additional water supply needs for the other growth centers of the basin. The project would reduce current flooding damages to $11,000 annually, meet the water supply need and provide adequate area in the flood plain to accommodate urban expansions. The capability for augmenting low flows for water quality purposes would exist in the project, but current FWPCA studies do not confirm the estimated needs. A more complete discussion of alternative means for meeting water supply needs and quality is discussed in Paragraph 7 of this chapter.

Flood plain management based on good flood plain information should be implemented to guide the development of the flood plain, the need for some form of local protection may arise in the future. Further studies would be necessary to evaluate the alternative means for water quality management.

Jefferson, Georgia. Water needs of the Jefferson, Georgia growth center are related to about $4,000 annual flooding damages at present, to the need for about 60 acres of flood plain lands for urban development by 2020, and the 2020 need for about 4 mgd of water supply, and 2,000 acre-feet of water quality storage.

The water supply needs can be met by the potential Curry Creek Reservoir and flood plain management based on good flood plain information should provide the land required for urban development and

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ameliorate flooding damages. Some form of local protection projects may be needed in the future. Water quality management should be investigated in future studies.

Winder, Georgia. The Winder, Georgia growth center will need about 80 acres of flood plain land for urban development, 7 mgd water supply and about 4,000 acre-feet of water quality storage by 2020. The potential Curry Creek Reservoir could meet the water supply need, or the operating Marbury Creek upstream watershed could possibly be modified, while future studies would be required to fully evaluate the water quality management problem. Flood plain management based on good flood plain information should provide the land required for urban uses.

Basin Plan. The plan of development for the upper Oconee River Basin includes the following components:

Projects in Operation or Expected to be in Place by 1980:

USDA Upstream Watersheds

Haynes-Brushy Fork Creek
Little Sandy and Trail Creeks
Sandy Creek
Middle Oconee-Walnut Creek
Barber Creek
Marbury Creek

For Authorization:

Corps of Engineers

Curry Creek Reservoir

For Continuing Study:

USDA Upstream Watershed Projects

North Oconee River

Future Studies

Flood Plain Information Studies at:

Athens, Georgia
Winder, Georgia
Commerce, Georgia
Jefferson, Georgia

Water Quality Management Studies at:

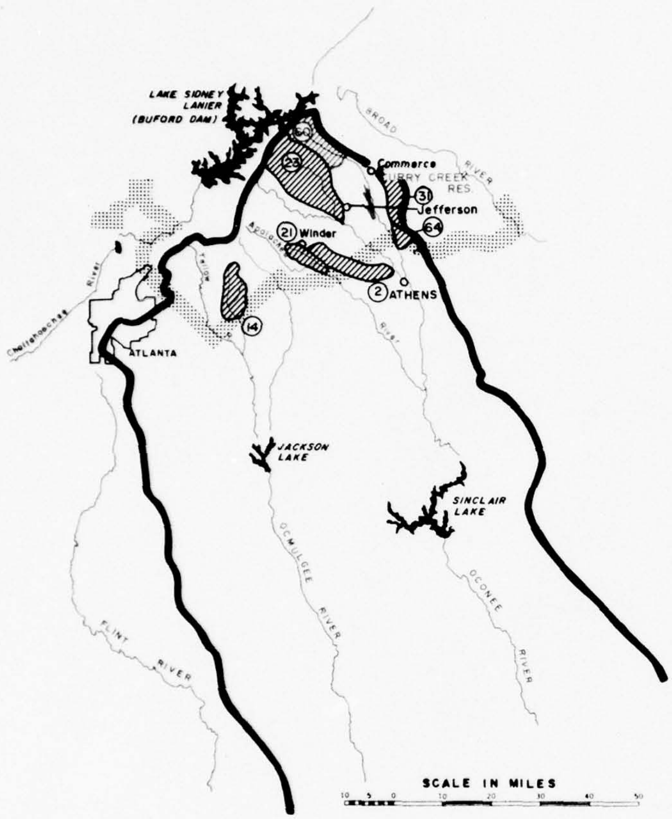
Athens, Georgia
Winder, Georgia
Commerce, Georgia
Jefferson, Georgia

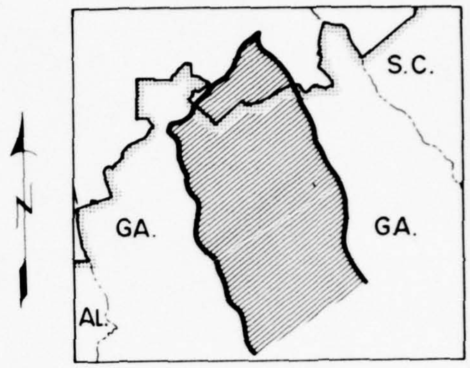
Local Flood Protection:

Athens, Georgia

TABLE 8-15. EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN OCONEE RIVER BASIN, SUB-REGION D

ITEM	NEEDS	ALTERNATIVE PROJECTS: Curry Creek Res. (CE)	ALTERNATIVE PROJECTS: N. Oconee River WS (USDA)	UNMET NEEDS	INDICATED FUTURE STUDIES
Water Supply	(mgd)				
Jefferson	4	4		--	
Winder	7	7		--	
Commerce	5	4.7	0.3	--	
Athens	50	50		--	
Water Quality	(1000 AF)				
Jefferson	2				
Winder	4			4	Water Quality Management Study; Advanced Treatment
Commerce	2				
Athens	17			17	Water Quality Releases from Curry Crk.; Advanced Treat.
Flood Control (Current Damage)	($1000)				
Jefferson	4			4	Flood Plain Management
Winder	--			--	
Commerce	--			--	
Athens	91	80		11	Local Flood Protection; Flood Plain Management
Flood Control (Future urban land use in flood plain - acres)					
Jefferson	60			60	Local Flood Protection; Flood Plain Management
Winder	80			80	Flood Plain Management
Commerce	60			60	Flood Plain Management
Athens	510	315		195	Local Flood Protection; Flood Plain Management
Recreation Days (1000's)	5,500	1,500	--	4,000	
Power (Peak demand, Gigawatts)	3.80			3.80	
Performance Index #1		1.6	2.1		
Performance Index #2		4.4	3.0		





VICINITY MAP

LEGEND

BOUNDARY

APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

UPSTREAM WATERSHED PROJECT IDENTIFICATION

EXPECTED TO EXIST BY 1980

- 2 Barber Creek
- 14 Haynes Creek - Brushy Fork Creek
- 21 Marbury Creek
- 23 Middle Oconee - Walnut Creek
- 31 Sandy Creek
- 64 Little Sandy And Trail Creek

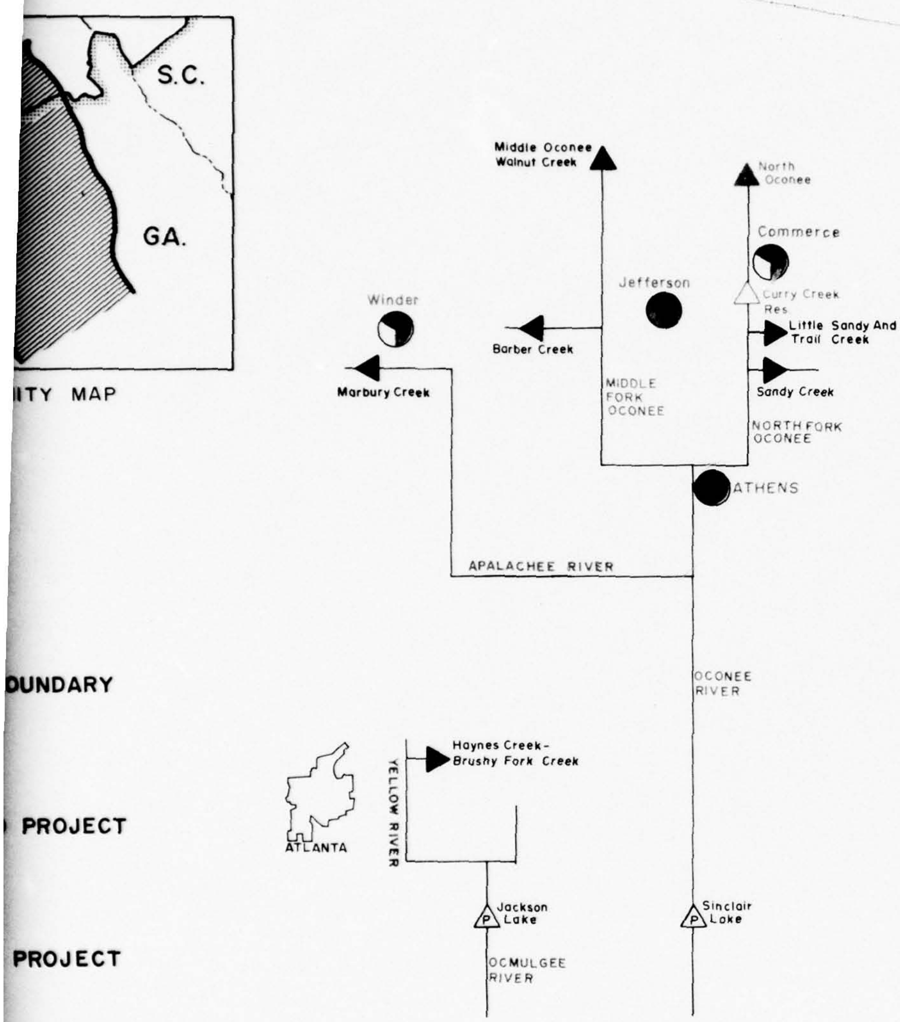
ALTERNATIVE AVAILABLE FOR PLANNING

- 60 North Oconee

OCONEE AND OCMULGEE RIVER BASINS

GEORGIA

ALTERNATIVES LOCATION MAP



OUNDARY

PROJECT

PROJECT

ULGEE
INS

TIVES
MAP

LEGEND

NEEDS

- WATER QUALITY
- WATER SUPPLY
- FLOOD CONTROL

ALTERNATIVES

EXPECTED TO EXIST BY 1980:

△ MAJOR RESERVOIR ; P INDICATES NON-FEDERAL OWNER

▲ UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES:

△ MAJOR RESERVOIR:

▲ UPSTREAM WATERSHED PROJECT

OTHER

TOWN NAME PRIMARY GROWTH CENTER

Town Name SECONDARY GROWTH CENTER

OCONEE AND OCMULGEE
RIVER BASINS

GEORGIA

SCHEMATIC OF WATER NEEDS
AND
ALTERNATIVE SOLUTIONS

II-8-81 FIGURE 8-9

2

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13. THE SYSTEM - SUB-REGIONAL - GENERAL

Water Supply, Water Quality Improvement, and Flood Control - The preceding paragraphs have discussed the water supply problems that are now facing the identified growth centers and the needs that are expected to develop during the next 50 years. These identified needs amount to some 495 mgd and can generally be satisfied by the plan recommended. The same can generally be said about the elimination of serious flooding damage and provision for water quality improvement needs on the Yadkin & Broad Rivers. However, the sub-region as a whole has many towns, non-incorporated communities, and rural areas that will be affected by all these problems. It is estimated that about 780 mgd of water supply for domestic and industrial purposes and 140,000 acre-feet of water storage for quality improvement purposes will be needed for these non-identified areas before 2020, and that they have existing annual flood damage of about $745,000. The development of rural water districts and their distribution systems may result in an increase in water supply demand estimate for these areas.

A part of these needs can, and will, be supplied from the improvements that will result from the studies that comprise a part of the recommended plan. Much of the water supply and flood protection can be furnished by upstream watershed projects that either have been studied by the U.S. Department of Agriculture's Soil Conservation Service or which will be studied, as the need arises. Those for which studies have been made are shown on Figure 8-11, at the end of this chapter. Water supply requirements for both urban and rural use should be one of the prime purposes considered in all future investigations and plans, and the reports should furnish complete information concerning the sites where water can be impounded for this purpose, the amount of storage that could be made available, and the anticipated yield in million gallons per day.

Water quality estimates, in areas not covered by definite project proposals, were based on short cut procedures which are based on generalized assumptions. Detailed studies of assimilative capacity of localized streams could not be made within the time and monetary limitations of the study. However, the estimates should guide future investigations towards potential points of need and indicate the relative magnitude of needs. Dilution may not be a practical or economical alternative in many of the areas located very high in the drainage basins.

Recreation

The massive increase in needs for outdoor recreation, indicated in Figure 8-4, is based on BOR projections in Appendix F. A simplified estimate of water surface area required to meet needs for fishing, boating, and swimming, based on BOR estimated relationships in 1980, is included in the following figure. While the estimated availability omits water surface of rivers and streams and many small impoundments, the

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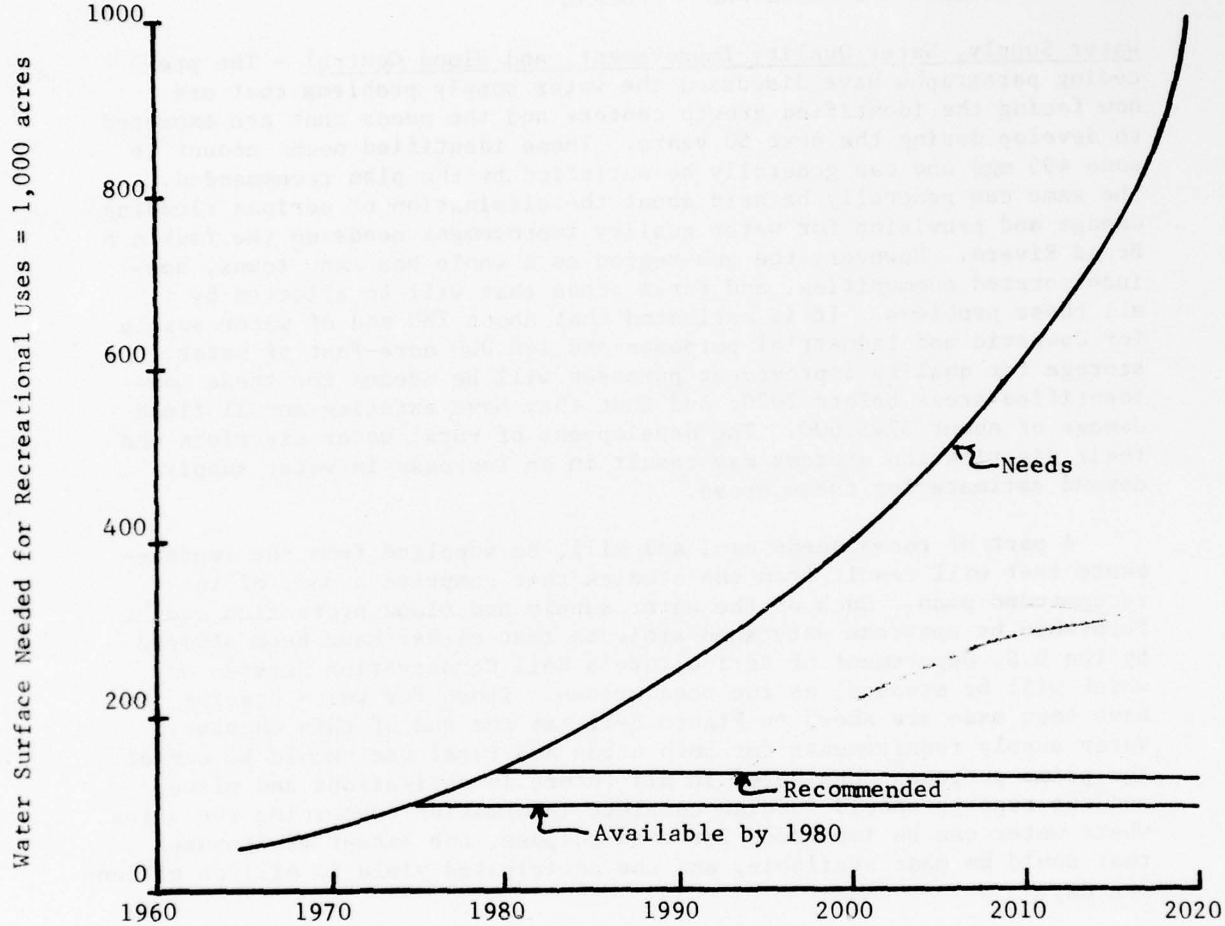


Available by 1980				Recommended	
Corps of Engineers & others	(area)	Duke Power Company	(area)	Project	Area
W. Kerr Scott	1,470	Lake James	6,510	Roaring	820
Reddies	720	Lake Rhodhiss	3,515	Clinchfield	20,220
Hartwell	56,000	Lake Hickory	4,110	Curry Creek	5,700
N. Saluda	1,080	Lookout Pond	1,270		
Table Rock	500	Lake Jocasse	18,370		
S. Pacolet	200	Lake Keowee	7,570		
Wm. C. Bowen	1,600				
Total	61,570		41,345		26,740

Figure 8-10 - Water Surface Needs & Supply for Outdoor Recreation Use in Water Sub-region D

figure indicates that the sub-region has had enough development to meet all needs until about 1975 and the surface area of projects recommended in this report will approximately satisfy 1980 needs.

In accord with present trends, the Bureau of Outdoor Recreation has estimated that by 2020 the water oriented recreation demands would be 157.7 million man days annually. If the same density of use as in 1980 is used as a measure, then 1.15 million acres of water surface would be required equal to about 16% of the total area of the sub-region. It appears that more intensive use of water surfaces and the surrounding areas will be required, including higher mid-week use than at present. The importance of Duke Power Company projects, in meeting outdoor recreation needs, is evident since nearly 40 percent of the water area available by 1980 will be furnished by those projects.

Additional water surfaces will result from the studies that are recommended for future accomplishment in preceding paragraphs. Additional developments on the Yadkin, tributaries of the Broad, and on the Savannah River may supplement some aspects of the upstream watershed projects that are expected to be implemented by the Soil Conservation Service of the Department of the Agriculture. The SCS projects can accommodate effective recreational development. Five of the ten favorably considered upstream watersheds include outdoor recreation as a project purpose. In the five, ten multi-purpose reservoirs would provide about 880 acres of water. Recreation days that would be provided are estimated to be about 228,000 annually. The Bureau of Outdoor Recreation indicates that many small single-purpose reservoirs or high density recreation areas near the growing metropolitan centers of Winston-Salem, Greensboro and High Point, North Carolina, and Spartanburg-Greenville in South Carolina, will be needed by the year 2020. The Chattooga River in northeast Georgia, South Carolina, and North Carolina has been identified as having high scenic qualities. Its potential as a free-flowing stream will help satisfy many of the needs for outdoor recreation opportunities. It is located in an 805,000-acre area, described in the Southeast River Basin Study as the Highland Project and in which the principal purposes would be for general recreation and fish and wildlife.

The National Forests represent another recreation resource that can help meet both present and future needs. The forests provide both streams and artificial impoundments for the enjoyment of the fisherman, the hunter, the camper, the picnicker and the sight-seer. The forests also provide trails for hiking and riding, scenic drives, opportunities for nature study and for photography. It is estimated that these forests can provide for 330,000 man days of this type of outdoor recreation annually, from provision of facilities adequate to accommodate 6100 persons at one time.

Supplement A to Appendix F, prepared by the Forest Service, describes the recreation opportunities in the forests and some of the improvements that are expected to be made in the near future. The

location and extent of the National Forest lands are shown on Figure 7-7. The reservoirs and upstream watershed projects mentioned above are shown on Figure 8-11.

Conservation

Upstream watershed development has been mentioned in preceding paragraphs when discussing the problems of the various growth centers. However, there are many problems over the sub-region that revolve around floodwater damage, erosion and sediment damage, agricultural water management, and the management of crop-land, grazing land, and the forested areas. These are all problems that fall under the purview of the Department of Agriculture and particularly to the Soil Conservation Service and the Forest Service.

In addition to meeting the most urgent conservation needs of the Sub-region, the U. S. Department of Agriculture recommends acceleration of land treatment and management programs for privately owned and National Forest lands. This acceleration will provide continued production of food and fiber and reduction of floodwater, erosion, and sediment damages. It will also increase outdoor recreational opportunities and improve the water and environmental quality of the sub-region. Priority will be given to critically eroding areas and the drainage areas above the recommended and existing water resource developments of the states, Corps of Engineers and others to improve their efficiency and useful life. The acceleration required is as follows:

1. Adequately treat and protect 37,400 acres of cropland, improve 55,400 acres of pasture and establish 88,100 acres of new pasture planting.

2. Revegetate and stablize critically eroding areas on 8,000 acres of roadbank and 80 acres of surfaced mined areas.

3. Increase recreational and fish and wildlife opportunities by the construction of 76 farm ponds, management of 1,700 farm ponds for fish production, construction of 58 miles of recreation access roads, development of 4,100 acres of wildlife habitat, plan for wildlife habitat preservation of 8,100 acres, and develop 8,700 acres for picnic areas and 1,500 acres for camping areas.

4. Develop 2,200 basic conservation plans and complete detailed soil surveys on 799,200 acres.

Acceleration for state and private forest and woodland includes:

1. Plant 159,000 acres in trees.

2. Treat 79,000 acres for erosion control.

3. Treat 107,200 acres for hydrologic stand improvement, 168,000 acres of harvest cutting, and protect 118,000 acres from livestock grazing.

4. Develop 1,800 forest and woodland management plans.

Planned acceleration for National Forests is as follows:

Tree Planting	Acres	11,100
Timber Stand Improvement	Acres	14,900
Soil and Water:		
Gully Stabilization	Acres	420
Stream Channel Clearing	Acres	690
Rehab. Abandoned Roads & Trails	Acres	1,980
Mined Area Stabilization	Acres	10
Soil Survey	Acres	150,000
Watershed Analysis	Acres	200,000
Fish & Wildlife:		
Big Game Range Analysis	Acres	148,000
Small Game Range Analysis	Acres	43,600
Wildlife Openings	Acres	6,600
Seeding and Planting	Acres	140
Stream and Lake Surveys	Acres	3,600

The structural measures include: Construction of (a) 4 acres of impoundment for recreation, (b) 240 acres of developments, (c) 20 miles of road and trails, and (d) bridges; improvement of 4,200 acres of stream and lake habitat for fish and wildlife; and acquisition of 130,000 acres of land.

Power

Provisions for meeting the electric power requirements in Sub-region D are described in Section II, Page 8-27 of this chapter. It appears that present planning of the utility companies that supply this area will provide for all needs until past 1980, and it is expected that advance planning will continue.

Comprehensive studies are here recommended for the further development of the water resources of the several basins in the sub-region. These studies should consider the possible use of impoundment for supply of cooling water for thermal-electric installation. Some streams now have low-head hydroelectric installations which operate as run-of-the-river plants. To better develop the available water resources, consideration should be given to the substitution of a few high-head impoundments so flood flows can be stored and converted to useful purposes. The Catawba River has many of these run-of-the-river plants.

The use of pump storage peaking installations, to operate in conjunction with the thermal plants, should also be included in these studies.

Selected Plan

Figure 8-11 portrays the recommended plan of development for water resources in Water Sub-region D. There are two categories of project portrayed on this plate. The current program of water development

which can be assumed to be in place in 1980 is shown as "existing," while new proposals are in the "for authorization" category. Recommendations for further studies are outlined by area involved or by specific location if the area is quite limited.

A ranking of proposals by urgency of implementation is indicated below, to show the priorities for programming studies and construction. The priorities implied may be modified, when capabilities are considered and the effects of continuing investigations are added. Thus priorities indicate the current status of information and omit consideration of capabilities to implement studies or projects. The most urgent classification (I) should be given immediate priority and implementation. The second order of urgency (II) implies implementation within about five years, while the third order (III) would be deferred for more than five years.

I - <u>Immediate Implementation</u>

Roaring River Reservoir; should be phased immediately behind Reddies River Reservoir.

Clinchfield Reservoir.

Study of the Upper Saluda and Broad River Basins to resolve flooding, water supply, water quality and recreation problems with an analysis of the most favorable means for conveyance of water from the Clinchfield Reservoir and/or Keowee-Toxaway Project to meet water quantity and quality needs in the Greenville-Spartanburg-Easley growth area.

Reconnaissance study of potential flooding at Morganton, North Carolina.

Curry Creek Reservoir.

USDA Upstream Watershed projects; Cherokee Creek, South Pacolet River, Oolenoy River and Eighteen Mile Creek.

II - <u>Implementation Within the Next Five Years</u>

Flood Plain Information Studies at:

Wilkesboro-North Wilkesboro, North Carolina
Mt. Airy, North Carolina
Lenoir, North Carolina
Marion, North Carolina
Rutherfordton, North Carolina
Spindale, North Carolina
Forest City, North Carolina
Greenville, South Carolina

Spartanburg, South Carolina
Easley, South Carolina
Seneca, South Carolina
Liberty, South Carolina
Anderson, South Carolina
Belton, South Carolina
Athens, Georgia
Winder, Georgia
Commerce, Georgia
Jefferson, Georgia

Study of Water Quality Management and the Upper Savannah Basin, and the Upper Oconee River Basin.

Continuing Studies of USDA Upstream Watershed projects at Turner Creek, Hunting-Bear Creek, South Yadkin, Little Beaver Dam North Oconee River, Second Broad River (Camp-Cane) and North and Middle Tyger River.

III - Implementation may be Deferred for Five Years, or Longer

Study of the Yadkin River, oriented towards the middle portion of the river and considering water supply and quality problems, flood control, recreation and power and an analysis of the needs for diversion of water to Greensboro and High Point area.

Reconnaissance Study of Flooding at Spartanburg, South Carolina.

Study of multiple-purpose reservoirs at Tallow Hill.

Studies for local flood protection at Athens, Georgia.

Effectiveness of the Proposed Plan

The plan displayed here for Water Sub-region D was developed on the assumption that the counties and cities in North Carolina, South Carolina and Georgia falling in this sub-region will be able, with the stimulation provided by the Appalachian Development Act of 1965 and related measures, to raise their economy to a level approximating the national level of economic development. For Sub-region D, this would mean a population of 2,828,000 in the year 2000 and 4,431,000 in the year 2020, compared with 1,204,100 in 1960. For employment, it would mean 1,100,000 jobs in 2000 and 1,717,000 jobs in 2020, compared with 467,478 in 1960.

The proposed plan will cost about $93,948,000 and will have estimated annual user and redevelopment benefits of $7,308,000. It is not designed to have a uniform effect, but is specifically designed to direct public and related private water resource investments to those communities and

situations which have demonstrated the capability to grow, and, thereby, creating an opportunity to place investments where return on the public investment will be the greatest. Accordingly, the plan emphasizes the needs of regional growth centers where it seeks to remove the water related constraints to future increases in employment and productivity. While the needs of areas of demonstrated growth and areas with clear growth potential are emphasized the needs of all communities are given consideration in the planning process, for there is frequently a close connection between growth centers and the economy of the hinterland areas.

The plan selected is based on the careful study of the several alternative ways of providing the resources required for sub-regional economic growth as an element in Appalachian regional growth as a whole. While Appalachian regional growth is a stated objective of the Appalachian Resources Survey, the selected plan does not ignore overall national interest in that it seeks to meet regional needs by means of a series of projects economically justified from the national point of view. Indices of project performance from both the regional and national viewpoint are presented for each major project and program recommendation.

The effectiveness of the selected plan can be appraised, in part, by review of Tables 8-11 through 8-15 which indicate the magnitude of the needs which could be met by the several alternative approaches considered. In some instances, it is clear that further studies must be made to determine the best way of meeting sub-regional needs, but solutions have been found for most immediate needs and those falling in the early future.

Since the recommended plan overlays a continuing public and private program for water resources development, a definite statement of the marginal income contribution of the recommendations over the continuing programs is not possible. The definite project recommendations in Sub-region D are the same kind, and, in all probability, the same scale as would be forthcoming if PL 89-4 had not been enacted. The Act and this study may serve to accelerate the construction of recommended projects. A unique contribution of this study is probably limited to an overview of total needs and ways of meeting these needs; for example, a look at both water sources and distribution for the total Greensville-Spartanburg area rather than the emphasis on sources or on distribution networks alone. Gains are in economy of planning, and a synthesis of system requirements rather than an emphasis on the individual increments of the system.

There are three principal reservoir projects recommended for early construction by the Sub-region D plan: (1) the Roaring River project, (2) the Clinchfield project, and (3) Curry Creek Reservoir. The need for flood control at Elkin-Jonesville, and the need for water related recreation opportunities in the Upper Yadkin Basin are urgent and place recommendations for Roaring River project in the immediate category. Likewise, the need for development of a large source of water with necessary conveyance facilities is a current problem facing planners in the Greenville-Spartanburg area. The selection of Clinchfield project

for early completion as the best way to meet total needs is made in light of other suggestions; such as, the proposal to install a new treatment plant and convey treated water from the Keowee-Toxaway project to Greenville, a possibility advanced in April 1968. The details of conveyance and the role of the Keowee-Toxaway project in meeting a part of the area's water supply needs are proposed for early and continuing study. Completion of Curry Creek Reservoir at an early date will relieve a current deficit in dependable water supply at Athens, reduce flooding to allow orderly flood plain development and provide additional water related recreation opportunities to the growing region.

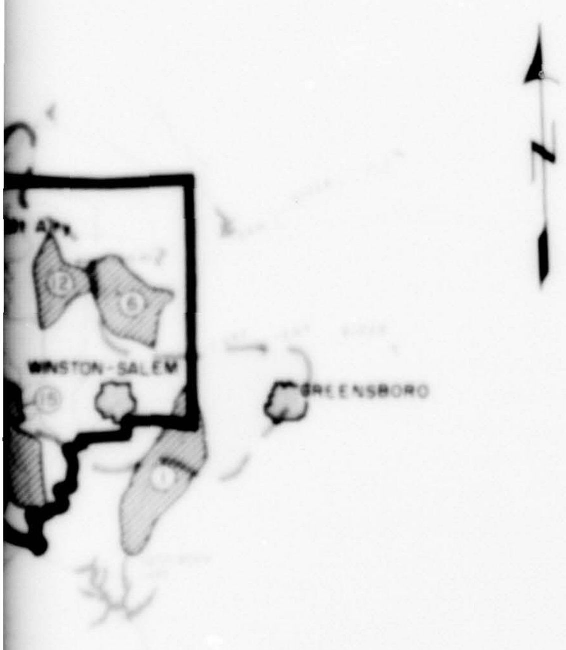
Detailed estimates of employment and wage gain permitted by the implementation of the Roaring River, Clinchfield and Curry Creek projects and their associated investment programs have been made. Increments of population and employment gains which could be associated with these projects total 151,000 and 59,000, respectively. The same gains could be accomplished with other higher cost alternatives or some substitution of "dry" for "wet" industries might be possible if water supply needs cannot be met. Thus, there is some question of defining the absolute net advantage of the plans in terms of income and employment.

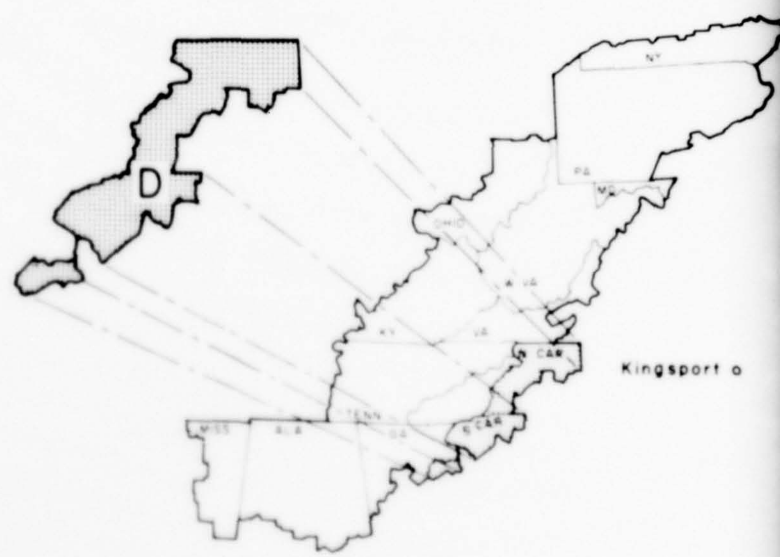
Perhaps the best description of the effectiveness of the Plan would be that: the Plan (Definite Project Proposals and Future Studies) appears to be capable of meeting the water needs imposed by accelerating economic development of Sub-region D to the point that rough parity with the nation in per capita income, in employment, and population growth, would be attainable by 2020. The proposals would appear to be practical and obtainable measures by which the water needs could be met. There are no obvious alternatives which are more efficient at this time.

UPSTREAM WATERSHED IDENTIFICATION

EXPECTED TO EXIST BY 1980	FOR AUTHORIZATION	FOR CONTINUING PLANNING
	NORTH CAROLINA	
1 ABBOTTS CREEK		8 CAMP CANE CREEK
2 DEEP CREEK		16 TURNER CREEK
4 MUDDY CREEK		17 HUNTING BEAR CREEK
5 STEWARTS-LOVILLS CREEK		19 UPPER SOUTH YADKIN
6 TOWN FORK CREEK		
9 DUTCHMAN CREEK		
12 LITTLE YADKIN RIVER		
	SOUTH CAROLINA	
1 BRUSHY CREEK	20 EIGHTEEN MILE CREEK *	15 LITTLE BEAVER DAM
2 TWELVE MILE CREEK		18 CHEROKEE CREEK *
3 BIG CREEK		22 NORTH AND MIDDLE TYGER
4 BROAD MOUTH CREEK		25 SOUTH PACOLET RIVER *
5 CONEROSS CREEK		4 OOLENOY RIVER *
6 HUFF CREEK		
7 THICKETTY CREEK		
8 THREE AND TWENTY MILE CREEK		
9 WILSON CREEK		
13 GEORGES CREEK		
17 SOUTH TYGER RIVER		
	GEORGIA	
2 BARBER CREEK	60 NORTH OCONEE	
6 NORTH FORK BROAD RIVER		
13 GROVE RIVER		
14 HAYNES CREEK-BRUSHY FORK		
21 MARBURY CREEK		
22 MIDDLE FORK BROAD RIVER		
23 MIDDLE OCONEE-WALNUT CREEK		
28 NORTH BROAD RIVER		
31 SANDY CREEK		
33 SOUTH FORK BROAD RIVER		
34 SOUTH RIVER		
46 HUDSON RIVER		
64 LITTLE SANDY & TRAIL CREEK		

2





VICINITY MAP

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UPSTREAM WATERSHEDS

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FOR CONTINUING PLANNING

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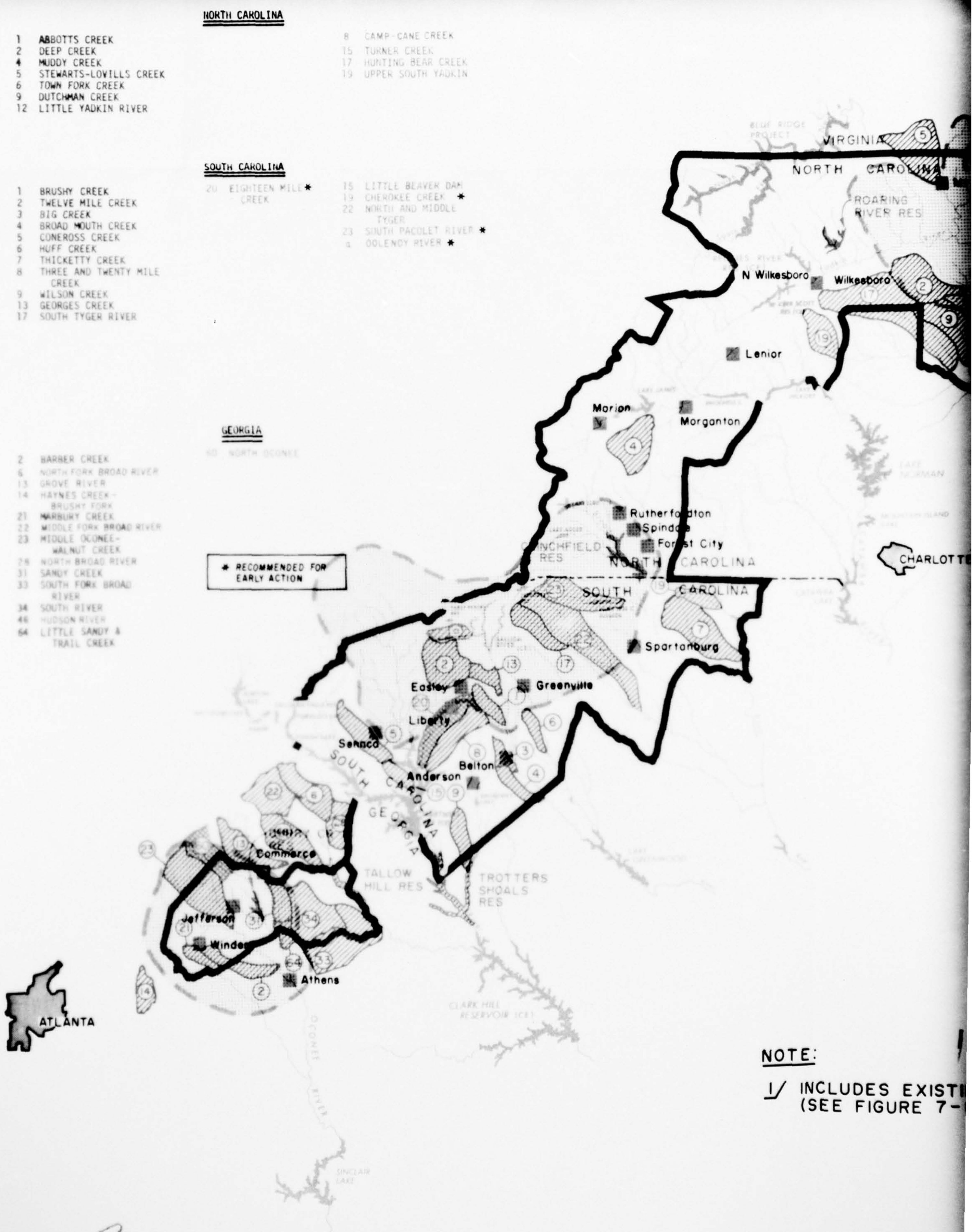
NORTH CAROLINA
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2 DEEP CREEK
4 MUDDY CREEK
5 STEWARTS-LOVILLS CREEK
6 TOWN FORK CREEK
9 DUTCHMAN CREEK
12 LITTLE YADKIN RIVER
8 CAMP-CANE CREEK
15 TURNER CREEK
17 HUNTING BEAR CREEK
19 UPPER SOUTH YADKIN
SOUTH CAROLINA
1 BRUSHY CREEK
2 TWELVE MILE CREEK
3 BIG CREEK
4 BROAD MOUTH CREEK
5 CONEROSS CREEK
6 HUFF CREEK
7 THICKETTY CREEK
8 THREE AND TWENTY MILE CREEK
9 WILSON CREEK
13 GEORGES CREEK
17 SOUTH TYGER RIVER
20 EIGHTEEN MILE CREEK *
15 LITTLE BEAVER DAM
19 CHEROKEE CREEK *
22 NORTH AND MIDDLE TYGER
23 SOUTH PACOLET RIVER *
OOLENOY RIVER *
GEORGIA
2 BARBER CREEK
6 NORTH FORK BROAD RIVER
13 GROVE RIVER
14 HAYNES CREEK-BRUSHY FORK
21 MARBURY CREEK
22 MIDDLE FORK BROAD RIVER
23 MIDDLE OCONEE-WALNUT CREEK
28 NORTH BROAD RIVER
31 SANDY CREEK
33 SOUTH FORK BROAD RIVER
34 SOUTH RIVER
46 HUDSON RIVER
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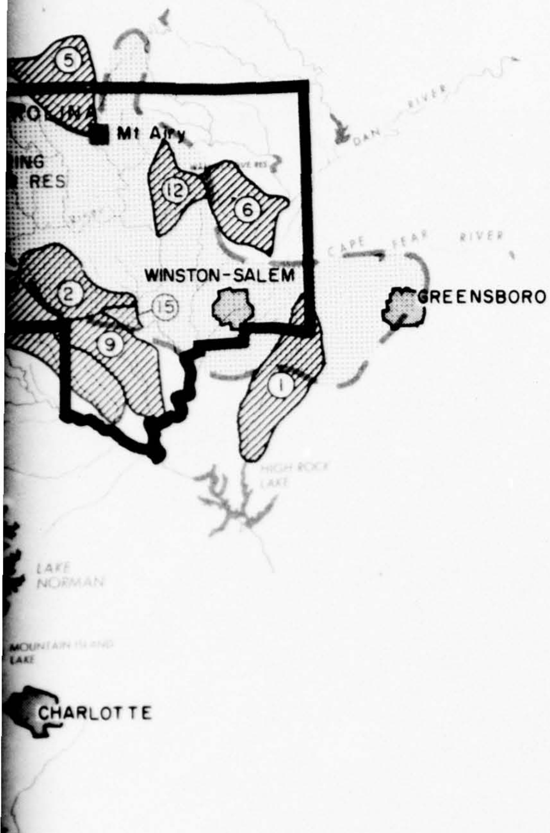

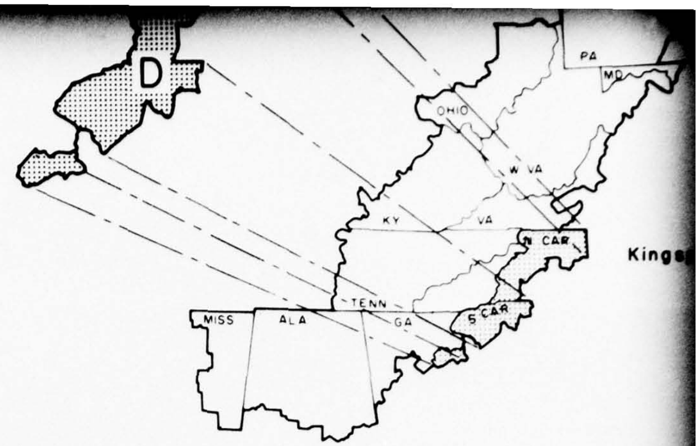

VICINITY MAP

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IN
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 FIGURE 8-

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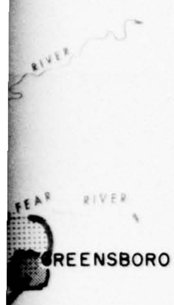

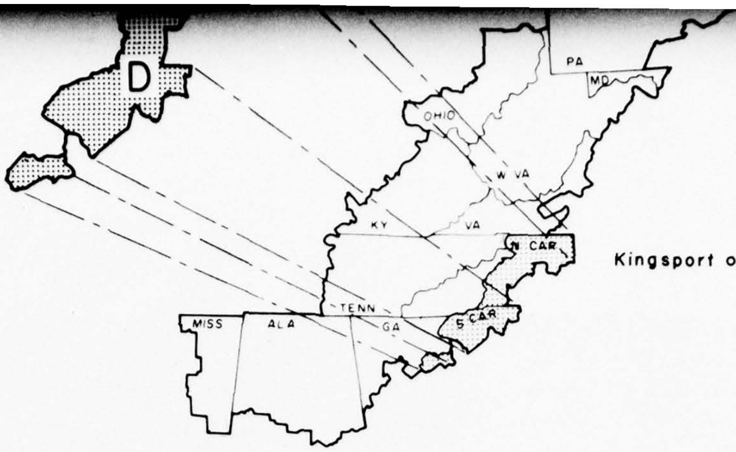

VICINITY MAP

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IN
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SCALE IN MILES

PLAN OF DEVELOPMENT

OFFICE OF APPALACHIAN STUDIES JUNE 1968

 FIGURE 8-11

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DEVELOPMENT
OF
WATER RESOURCES
IN
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MAIN REPORT
PART II
SHAPING A PLAN

CHAPTER 9 - WATER SUB-REGION E TODAY

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CHAPTER 9 - WATER SUB-REGION E TODAY

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CHAPTER 9 - WATER SUB-REGION E TODAY

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CHAPTER 9 - WATER SUB-REGION E TODAY

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(Cont'd)

CHAPTER 9 - WATER SUB-REGION E TODAY

SECTION I - THE REGION TODAY

1. POLITICAL

Sub-region E (See Figure 9-1, Page II-9-5), located in northern Georgia, northcentral Alabama and northeast Mississippi, forms the southernmost portion of the Appalachian Region. It is a land of diverse physical characteristics which are important factors influencing social and economic development trends, both past and present. Since the sub-region is large and served by several major river systems, it has been divided into five water areas designated E-1 through E-5, and into eight state planning sub-regions, for analysis of the economic and water resource problems and possible solutions. The water areas and state planning sub-regions are shown in Figure 9-15, and their general relationships to other planning areas are discussed in Paragraph 4.

The 38,391 square-mile sub-region is comprised of 75 counties; 29 in Georgia covering 9,377 square miles, 26 in Alabama covering 18,691 square miles, and 20 in Mississippi covering 10,323 square miles. There were 41 urban centers in the sub-region with a population of 5,000 or greater in 1960. Birmingham, the largest city in the sub-region and the second largest in Appalachia, had a population of 340,887. Tuscaloosa, with 63,370 residents, Gadsden, with 58,088, Anniston, with 33,657, Bessemer, with 33,054, and Rome, with 32,226, are other cities in the sub-region which had a population greater than 30,000 in 1960. Of the remaining cities, 21 had less than 10,000 inhabitants. Atlanta and Montgomery, the capitals of Georgia and Alabama, respectively, are located immediately adjacent to the sub-region to the southeast and south. Jackson, the capital of Mississippi, is 100 miles to the west.

There are 49 Soil Conservation Districts which include all agricultural and rural lands in the sub-region. These districts, formed under state law, provide leadership and coordinate activities of other state and Federal agencies in the interest of conservation and enhancement of water and other natural resources. In addition, water management, drainage, and development districts and authorities have been created as needed. The Chattahoochee River Basin Development Commission's area of interest in the sub-region is located almost entirely in the eastern and southeastern Georgia area. The Tombigbee River Valley Water Management District, the largest organization of its type located wholly within the sub-region, is comprised of all except six of the 20 counties in the Mississippi area. A similar organization, the Tombigbee Valley Development Authority, has recently been established which includes areas in the western Alabama portion of Sub-region E. Both of these organizations have been delegated responsibilities and authority by their respective State Legislatures for providing the requirements of local cooperation for the authorized

Tennessee-Tombigbee Waterway, a navigation canal which will connect the Tennessee and Tombigbee Rivers. Alabama and Mississippi are members of the Tennessee-Tombigbee Waterway Development Authority, a five-state compact which also includes Florida, Tennessee and Kentucky. This interstate compact approved by Congress is actively interested in promoting the development of the waterway. The Georgia area of the sub-region, excluding two counties, is covered by five multi-county planning commissions and includes 18 city and county planning commissions which work closely with the Georgia State Planning Bureau. Sixty-four planning organizations in the Alabama area at the city and county level coordinate their activities with the Alabama State Planning and Industrial Development Board. In the Mississippi area, there are 31 city and county planning commissions which are assisted in their planning efforts by the Mississippi (State) Research and Development Center.

Privately sponsored organizations active in the planning and promotion of water resource developments include the Upper Hiwassee Watershed Development Association, Chattahoochee River Basin Development Association, Coosa-Alabama River Improvement Association, Warrior-Tombigbee Development Association, Wolf River Association, Upper Hatchie Watershed Association and Big Black River Basin Development Association.

2. PHYSICAL

Physiography and Geology

There is an unusually wide range of topographic and geologic conditions in Sub-region E because of its location at the junction of six physiographic provinces. (See Figure 9-2, Page II-9-7.)

In the northeasternmost part, the rugged crystalline rocks of the Blue Ridge Province form a topography which is characterized by rounded mountains with peaks reaching elevations nearly 5,000 feet above mean sea level. Streams flowing through the steep, narrow valleys lying 1,500 to 2,500 feet below the peaks are subject to fast rises during storms, often resulting in flash floods.

To the south and southwest of the Blue Ridge Province lies the Piedmont Province, an area of ancient metamorphic rocks. Topographically, it is characterized by rolling hills and occasional low mountains, which are usually granitic monadnocks, that are 1,000 to 1,500 feet high in the northeasterly portion of the sub-region, and 300 to 700 feet high in the south-central portion.

The Valley and Ridge Province, on the west adjacent to the Blue Ridge Province and Piedmont Province, is alternating ridges and valleys extending southwestward to near the southern limits of the sub-region. This province with ridges 800 to 1,500 feet high is underlain in some areas by limestones that tend to be cavernous.

Paralleling the Valley and Ridge Province on the west is the Appalachian Plateau, a submaturely eroded upland with peaks rising 300 to 800

feet above the valley floors. Rocks of this area are stratified, and overlie the older rocks of the Valley and Ridge Province.

The Interior Low Plateaus adjoining the Appalachian Plateau to the north comprise a young to mature plateau with relatively deep valley dissections. This province borders the sub-region in the extreme northeast corner of Mississippi.

The Coastal Plain, which makes contact on the south and west with four of the above provinces, is largely underlain by marine sediments, generally poorly consolidated. The topography, for the greater part, is characterized by low hills with gentle slopes and broad valleys which contain slow-moving, meandering streams with wide flood plains. Generally, the topographic relief does not exceed elevation 500 feet above sea level, but ranges to as much as 800 feet above sea level in the more hilly area of extreme northeast Mississippi.

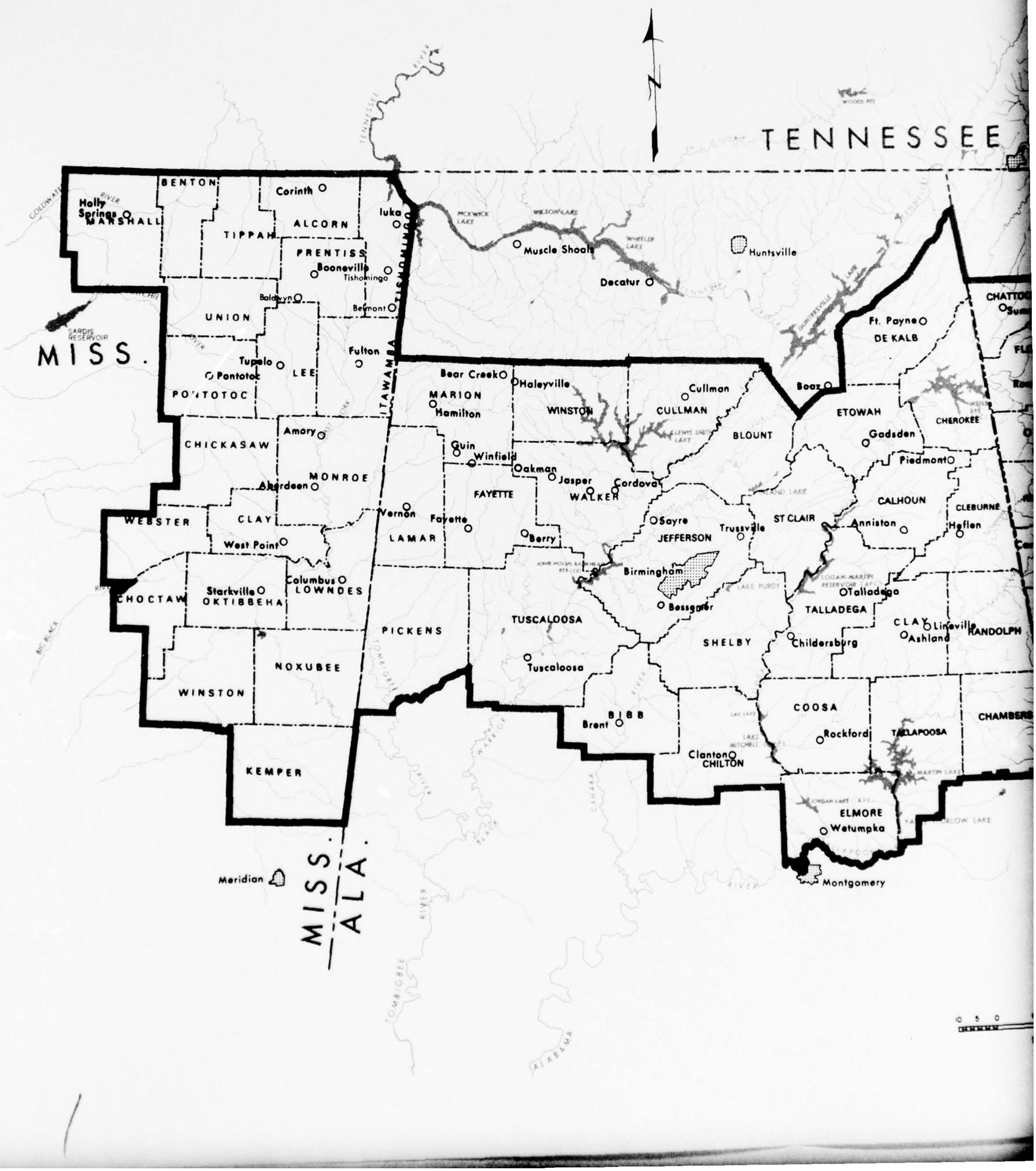
Major drainage of the sub-region is provided by the Chattahoochee River (tributary to the Apalachicola) in the eastern sector; the Coosa, Tallapoosa, Alabama (including its tributary, the Cahaba River), and Black Warrior Rivers in the central sector; and, the Tombigbee River in the west (See Figure 9-2). Smaller areas in the eastern, northern and western portions of the sub-region drain directly or ultimately to the Oconee, Ocmulgee, (tributaries of the Altamaha) Savannah, Tennessee, Hatchie, Coldwater, Tallahatchie, Big Black and Pearl Rivers. On an average day, more than 34 billion gallons of water, or 53,000 cubic feet per second (cfs), flow from the sub-region by way of these streams. Drainage, excluding the smaller fringe areas, is southerly, ultimately to the Gulf of Mexico.

The slopes of some of the headwater streams in the mountainous areas exceed 30 feet per mile. These slopes gradually diminish through downstream reaches to about one foot per mile in the Coastal Plains area. Banks of the major streams are fairly stable and vary from gorges as much as 500 feet deep in the mountain areas to about 20 feet in the downstream reaches. Channel width of the rivers varies from about 100 to 500 feet. Table 9-1 gives information on the characteristics of principal streams of the sub-region.

TABLE 9-1
PRINCIPAL STREAM CHARACTERISTICS FOR WATER SUB-REGION E

Stream	Station	Drainage Area (sq.mi.)	Miles above Mouth	Elev. at Gage (msl)	Dist. (mi.)	Slope (ft./mi.)
Chattahoochee R.	Leaf, Ga.	150	405.64	1220	25	17.1
Chattahoochee R.	Whitesburg, Ga.	2,430	259.85	682	170	2.7
Chattahoochee R.	West Point, Ga.	3,550	198.96	557	232	2.4
Tallapoosa R.	Wadley, Ala.	1,660	124.80	600	109	3.9
Conasauga R.	Tilton, Ga.	682	12.14	622	68	5.6
Coosa R.	Childersburg, Ala.	8,390	86.29	382	323	1.1
Mulberry Fk.	Garden City, Ala.	368	472.73	381	32	15.8
Black Warrior R.	Tuscaloosa, Ala.	4,828	347.05	83	189	2.7
Tombigbee River	Columbus, Miss.	4,490	364.66	129	65	0.7

Source: U.S. Geological Survey, U.S. Department of the Interior, and Corps of Engineers, U.S. Army.


TENNESSEE
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MISS.
ALA.
BENTON
Holly Springs
MARSHALL
Corinth
TIPPAH
ALCORN
Iuka
PRENTISS
Booneville
Tishomingo
TISHOMINGO
Baldwyn
Belmont
UNION
Fulton
Tupelo
Pontotoc
LEE
PONTOTOC
ITAWAMBA
Amory
CHICKASAW
MONROE
Aberdeen
WEBSTER
CLAY
West Point
Starkville
OKTIBBEHA
Columbus
LOWNDES
CHOCTAW
WINSTON
NOXUBEE
KEMPER
Meridian
SARDIS RESERVOIR
Muscle Shoals
Huntsville
Decatur
PICKWICK LAKE
WILSON LAKE
WHEELER LAKE
GUNTERSVILLE LAKE
Bear Creek
Haleyville
MARION
Hamilton
WINSTON
Cullman
CULLMAN
Guin
Winfield
Oakman
Jasper
WALKER
Cordova
FAYETTE
Vernon
Fayette
LAMAR
Berry
Sayre
JEFFERSON
Trussville
Birmingham
Bessemer
PICKENS
TUSCALOOSA
Tuscaloosa
BIBB
Brent
BLOUNT
Boaz
Ft. Payne
DE KALB
ETOWAH
Gadsden
CHEROKEE
Piedmont
CALHOUN
Anniston
CLEBURNE
Heflen
ST CLAIR
Talladega
TALLADEGA
CLAY
Lineville
Ashland
RANDOLPH
Childersburg
SHELBY
COOSA
Rockford
TALLAPOOSA
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Clanton
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ELMORE
Wetumpka
Montgomery
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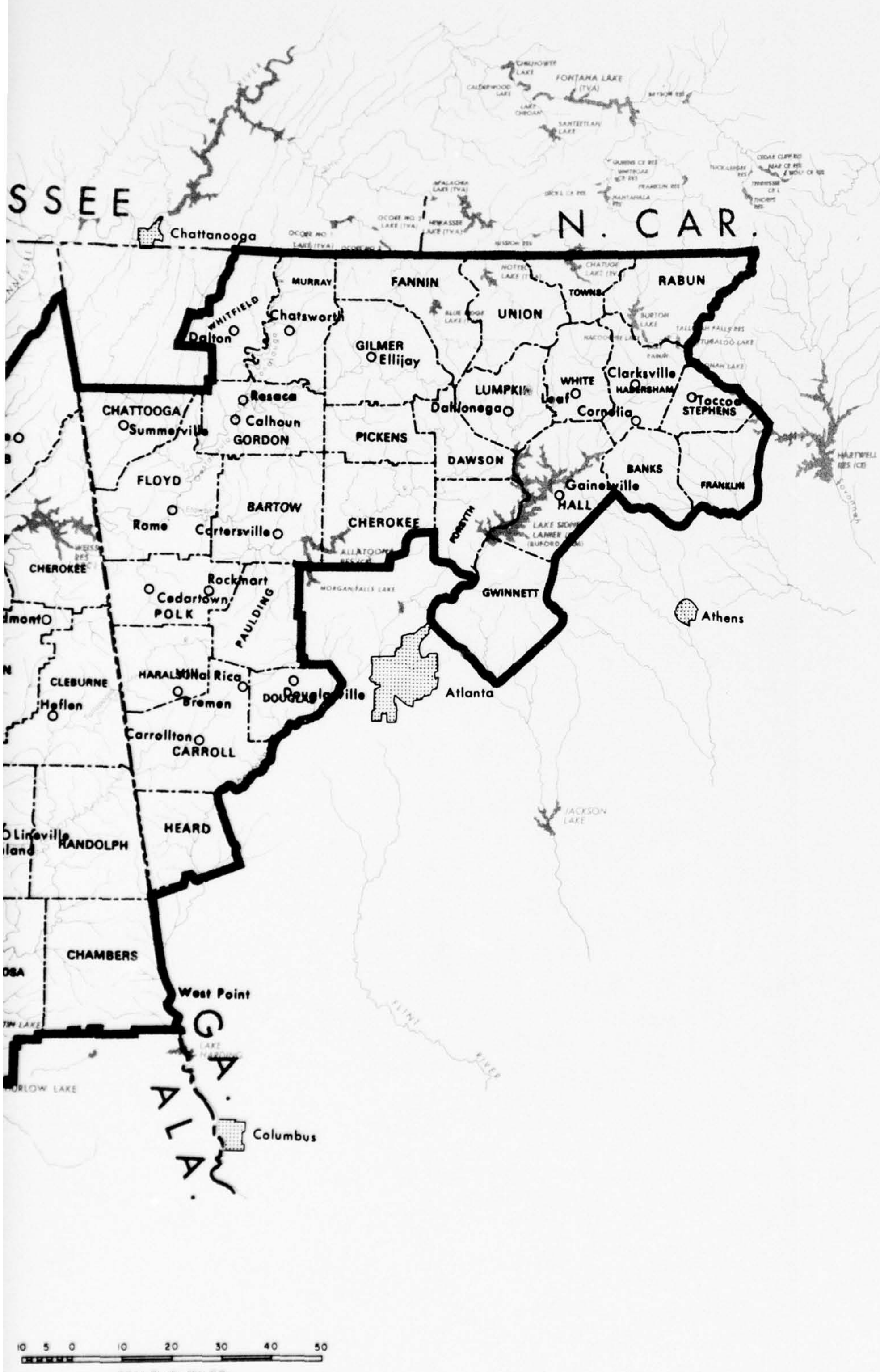

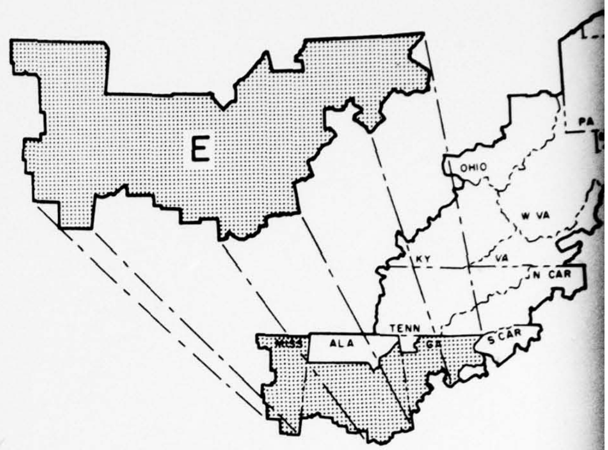

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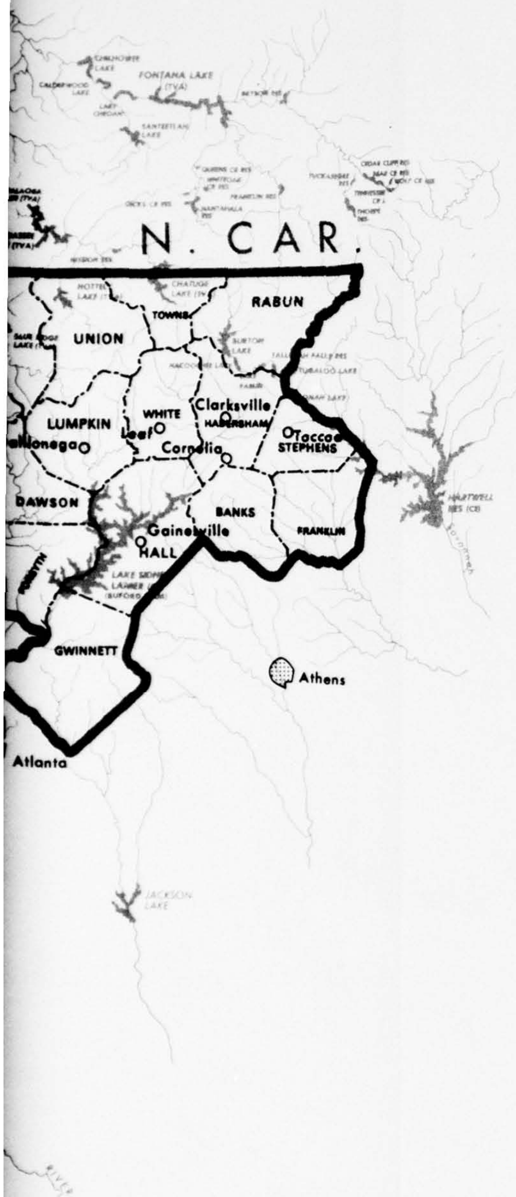

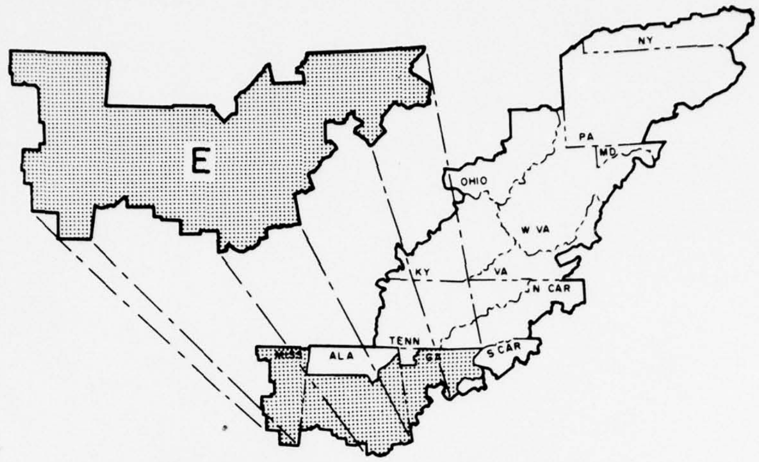

VICINITY MAP

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

LOCATION MAP

OFFICE OF APPALACHIAN STUDIES JUNE 1968

FIGURE 9-1

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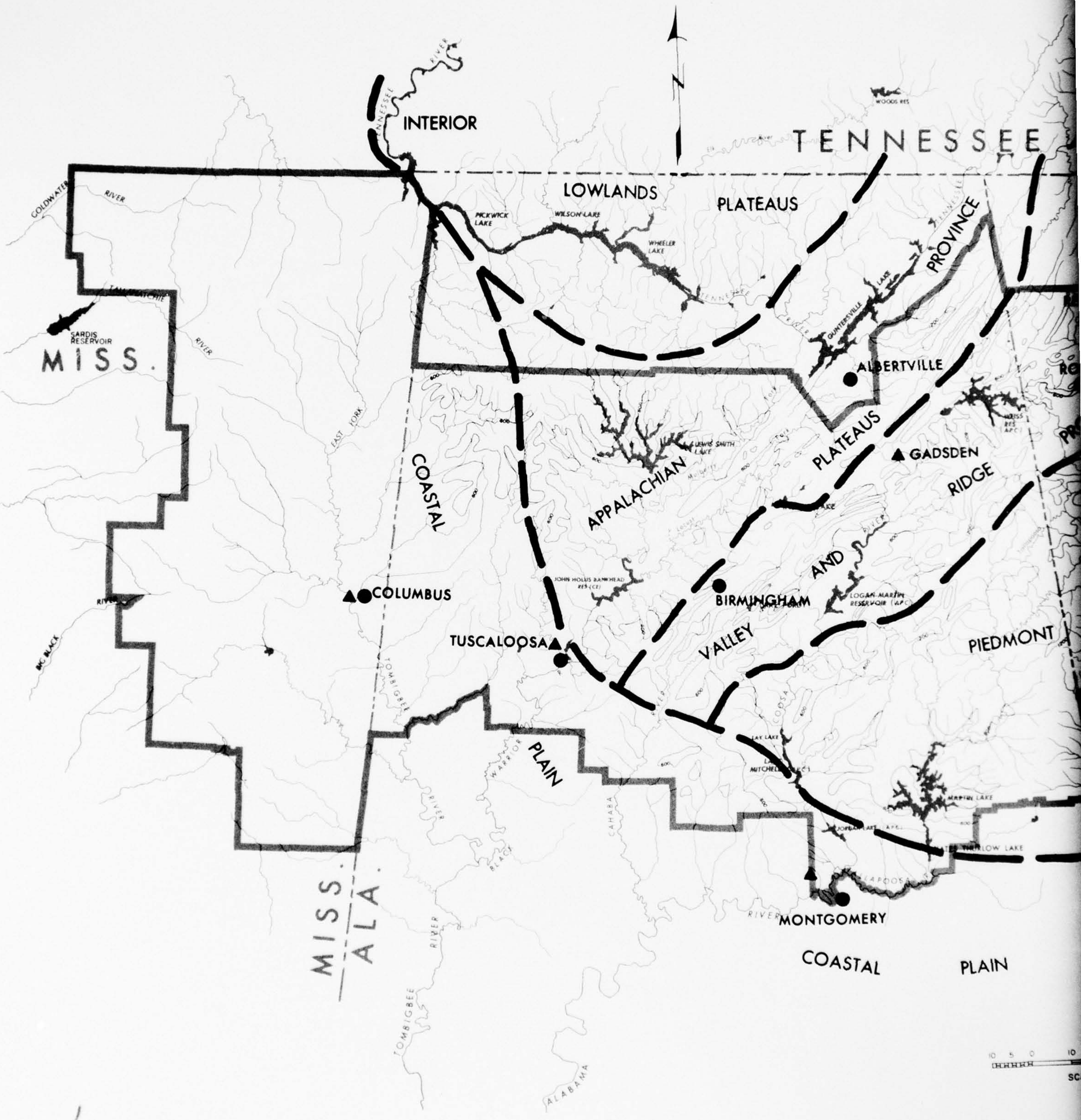

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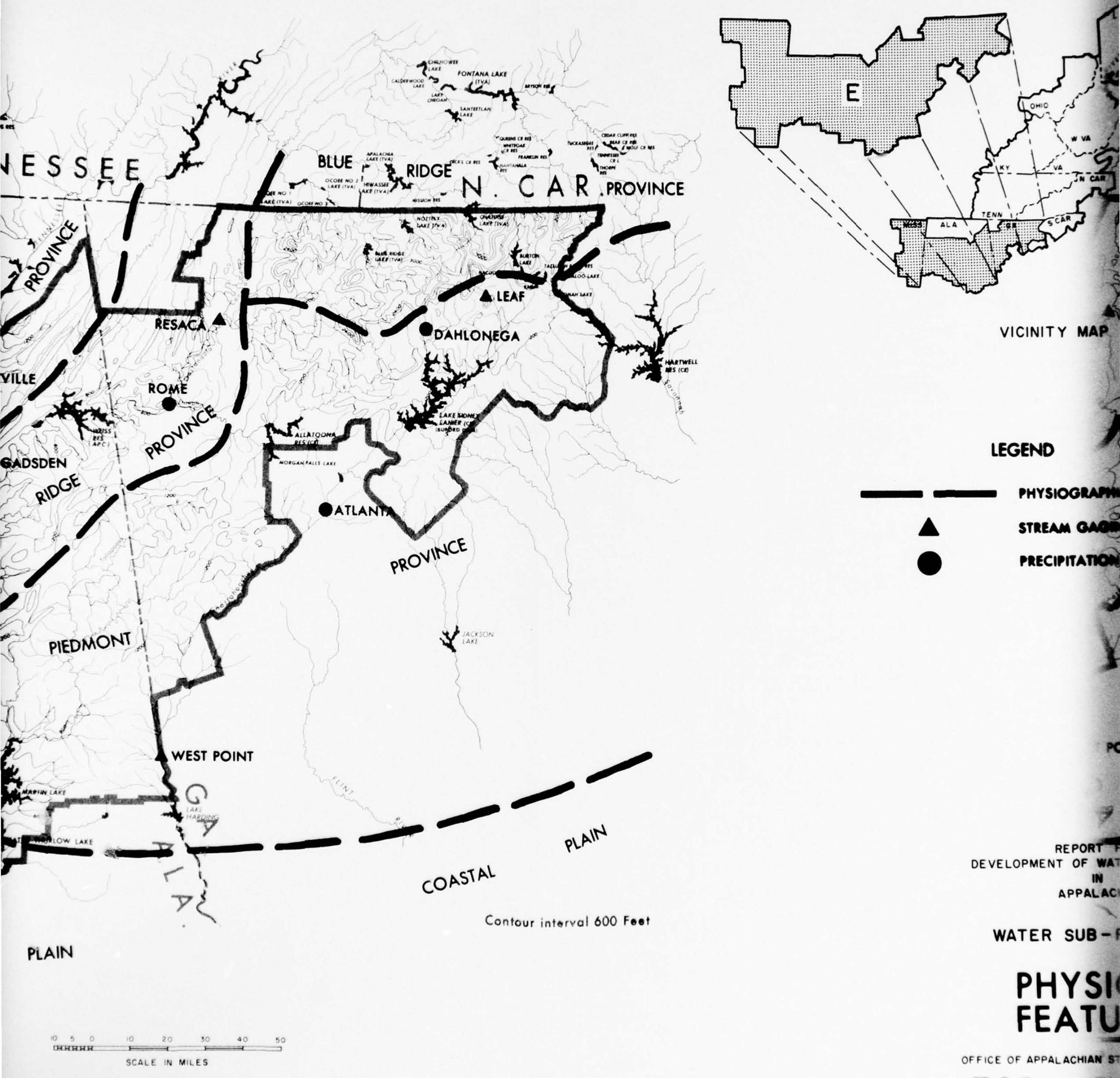
PROVINCE
SARDIS RESERVOIR
PICKWICK LAKE
WILSON LAKE
WHEELER LAKE
GUNTERSVILLE LAKE
ALBERTVILLE
APPALACHIAN
PLATEAUS
GADSDEN
RIDGE
AND
VALLEY
BIRMINGHAM
COASTAL
PLAIN
COLUMBUS
TUSCALOOSA
PIEDMONT
LEWIS SMITH LAKE
LOGAN MARTIN RESERVOIR (APC)
MARTIN LAKE
THURLOW LAKE
MONTGOMERY
COASTAL PLAIN
MISS.
ALA.
TOMBIGBEE
ALABAMA
COOSA
CAHABA



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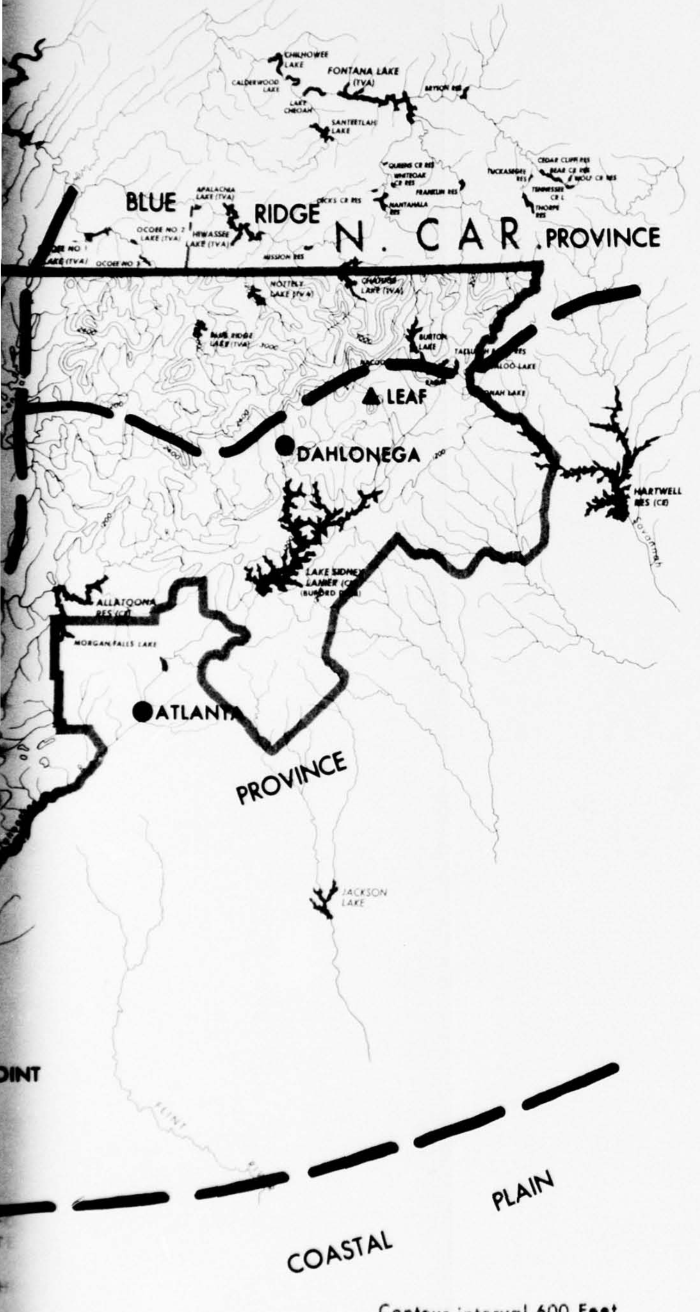

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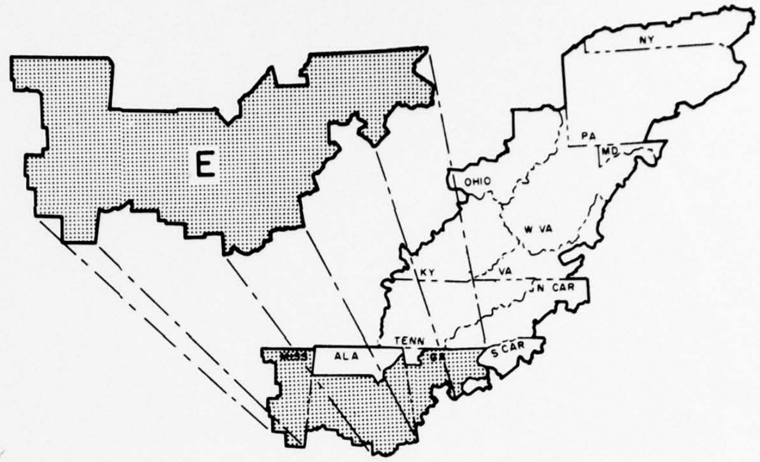

VICINITY MAP

LEGEND

- PHYSIOGRAPHIC BOUNDARY
- ▲ STREAM GAGING STATIONS
- ● PRECIPITATION STATIONS

REPORT FOR
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IN
APPALACHIA

WATER SUB-REGION E

PHYSICAL FEATURES

OFFICE OF APPALACHIAN STUDIES JUNE 1968

 FIGURE 9-2

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Climate

Water Sub-region E lies in the temperate zone and its climate is influenced by its geographical position near the Gulf of Mexico and the Atlantic Ocean. The Atlantic Ocean and semi-tropical Gulf of Mexico provide a warm moist climate with precipitation being fairly well distributed throughout the year.

There are 213 active rainfall measurement stations located in the sub-region, most of them operated by the U.S. Weather Bureau. Records from these and 36 discontinued stations are available for varying periods, the longest being 112 years of continuous record from the Corps of Engineers' station at Tuscaloosa, Alabama.

Sub-region E has a temperate climate with long, warm summers and short, usually mild winters. Freezing temperatures are common but are usually of short duration. The normal annual temperature averages about 62 degrees, ranging from 45 degrees in January to 80 degrees in July. Extreme temperatures recorded in this area vary from a low of -17 degrees to a high of 112 degrees. The average date of the first killing frost is November 4 and the last is March 26. Temperature data for selected stations are shown in Table 9-2.

TABLE 9-2

TEMPERATURE DATA FOR SELECTED STATIONS, WATER SUB-REGION E

			Degrees Fahrenheit				
		Period of		Average Monthly		Extremes of Record	
Station	County	Record	Average Annual	Jan.	July	Max.	Min.
			GEORGIA				
Dahlonega	Lumpkin	1874-1966	59.5	42.8	76.5	103	-11
Rome	Floyd	1855-1966	62.3	44.9	80.1	107	- 7
Atlanta*	Fulton	1879-1966	61.4	44.7	78.9	103	- 9
			ALABAMA				
Albertville*	Marshall	1928-1966	60.6	42.8	78.5	107	- 8
Birmingham	Jefferson	1896-1966	64.1	46.5	81.6	107	-10
Tuscaloosa	Tuscal.	1888-1966	64.3	46.9	81.7	108	- 7
Montgomery*	Montg.	1872-1966	65.0	48.1	81.8	107	- 5
			MISSISSIPPI				
Columbus	Lowndes	1875-1966	64.4	46.8	81.7	113	- 7

*Adjacent to Sub-region.

Source: U.S. Weather Bureau, Environmental Sciencies Services Administration, Department of Interior.

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Sub-region E lies in a region that normally receives an abundant rainfall which is fairly well distributed throughout the year. The annual rainfall over the area averages about 53 inches, with 15.5 inches or 29 percent occurring in the winter, 14.5 inches or 28 percent in the spring, 13.4 inches or 25 percent in summer and 9.6 inches or 18 percent in fall. March is generally the wettest month averaging over 6 inches and October the driest with 2.7 inches. Moderate snowfall occurs over the area during the winter months, but seldom covers the ground for more than a few days at a time and has not been an important contributing factor to any major flood. Precipitation data for selected stations are given in Figure 9-3 (See Figure 9-2 for station locations).

Flood-producing storms over the area are usually of the frontal type, occurring in the winter and the spring and lasting from 2 to 4 days. These storms often cover a large area and produce most of the major inundations. Summer storms are usually of the thunderstorm type with high intensities over small areas, frequently producing serious local flooding. With normal runoff condition, from 5 to 6 inches of intense general rainfall are required to produce widespread flooding, but on many of the minor tributaries 3 to 4 inches are sufficient to produce local floods.

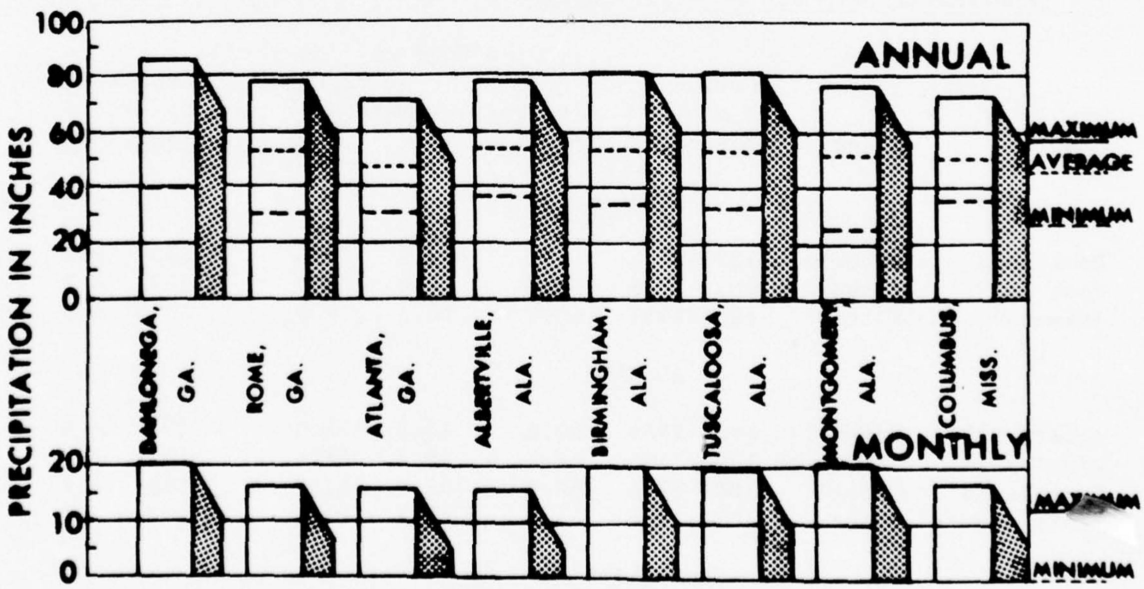

Figure 9-3. Average Precipitation at Selected Stations, Water Sub-region E

The three most recent storms which occurred over the area and produced widespread flooding were those of November 1948, March 1951, and December 1961. All three were frontal-type storms, with the heavy influx of warm, moist air from the Gulf of Mexico the principal constituent.

The initial losses and infiltration capacities vary widely on a seasonal basis, dependent upon topography, antecedent conditions, vegetation and soil. The initial losses vary from a maximum of 1.6 inches in the headwaters of the Coosa River to a minimum of 0.2 inch. For the same reason, infiltration capacities vary from a maximum of 0.19 inch per hour to 0.01 inch per hour.

Runoff

Records of surface runoff in this sub-region are available in publications of the U.S. Geological Survey. There are over 120 active stream gaging stations in this area.

Approximately 84 percent of the sub-region is drained by river systems within the Mobile District of the Corps of Engineers. Runoff data for these streams are considered representative and subsequent discussions are based on these data. Annual surface runoff averages about 21 inches for this area. This is about 40 percent of the rainfall. The runoff varies from about 36 inches in mountainous northeast Georgia to about 16 inches in east central Mississippi along the southern border of Appalachia. The following table (Table 9-3) presents runoff data for selected stations. The locations of these stations are shown in Figure 9-2.

TABLE 9-3
STREAM DISCHARGE DATA AT SELECTED STATIONS, WATER SUB-REGION E

Stream and Station	Drainage Area (sq. mi.)	Period of Record	Annual Runoff (inches) Max.	Min.	Mean	Discharge (cfs) Max.	Date
Chattahoochee R. near Leaf, Ga.	150	1939-1966	58.77	18.98	35.95	16,200	12-03-63
Chattahoochee R. at West Point, Ga.	3,550	1896 1966	38.57	11.00	21.33	134,000	10-12-19
Oostanaula R. at Resaca, Ga.	1,610	1892 1966	37.78	10.51	23.37	54,800	31-03-51
Coosa River at Gadsden, Ala.	5,800	1926-1966	34.90	10.94	21.85	76,900	11-04-36
Alabama R. near Montgomery, Ala.	15,100	1927 1966	34.53	12.71	21.10	283,000	26-02-61
North River near Tuscaloosa, Ala.	366	1951-1966	28.25	10.73	19.97	27,200	22-02-61
Tombigbee River at Columbus, Miss.	4,490	1899-1966*	34.08	4.68	18.86	148,000	7-01-49

*Intermittent record.

Groundwater discharge with the above streams and their tributaries flowing at a rate expected 90 percent of the time varies from 100,000 to 300,000 gallons per day per square mile (gpd/sq.mi.) in the eastern part of the sub-region and 0 to 50,000 gpd/sq.mi. in the western part. Groundwater for domestic, agricultural and industrial use is available in limited-to-moderate amounts throughout most of the sub-region. Individual wells properly located and constructed will yield from three to 100 gallons per minute (gpm) in the eastern portion, 100 to 300 gpm in the western portion and more than 600 gpm in the north-central area.

Transportation Networks

Facilities are available in the sub-region for all types of transportation in common use, but there is an uneven distribution of facilities and a marked variation in their quality which adversely affect economic

growth and development. The major highway system (Figure 9-4), with the hubs at Atlanta in Georgia and Birmingham in Alabama, is constantly being improved and expanded in efforts to meet the rapidly increasing automobile and motor transport needs. Nevertheless, some of the spokes, or highways, which only a few years ago were deemed adequate for the foreseeable future, need strengthening (widening or otherwise improving), and new ones are now, or soon will be, required. One of the more pressing needs exists in the north Georgia mountain area which has not benefited from highway development, in proportion to other areas of the sub-region, probably because of the high cost of construction in rugged terrain. Other existing highway needs, or those anticipated in the future, include improved access westward from Birmingham to and beyond the Mississippi Appalachian area, and a bisecting north-south artery traversing the Mississippi area which would connect with east-west interstate routes located to the north and south of the sub-region. The secondary road system has been vastly improved and expanded over the past 20 years. Paved roads now connect nearly all the smaller populated centers with larger towns and cities located within and outside the sub-region. There still remain, however, some areas of need as in the north Georgia mountains.

One waterway within the sub-region has been an important factor in economic growth and development for over half a century and another, located adjacent to the sub-region, is expected to have a future impact. The Black Warrior*/ with a nine-foot-deep barge canal, the uppermost segment of the Black Warrior and Tombigbee River Waterway, which serves the western Alabama area of the sub-region, including the Birmingham industrial complex, connects with the Gulf Intracostal Waterway at the deep-water port of Mobile, Alabama, via the Tombigbee and Mobile Rivers. The Tennessee River with a nine-foot-deep navigation channel, an integral part of the Mississippi River waterway system, forms the border of the sub-region in the northeastern corner of Mississippi (See Figure 9-5).

Rail and air transportation are also available in the sub-region with connections for access to other regions of the Nation. The railroad system (shown in Figure 9-5) serving all the larger cities and many of the smaller populated centers is generally adequate and, as a whole, has operated below capacity in the years following World War II. With improved rolling stock and the more efficient operating methods now in practice, an increase in freight volume could be handled with existing facilities. This would possibly involve improvement of the system in some areas such as strengthening rails, roadbeds and bridges for the heavier rolling stock required and the increased loading.

Air transportation is lacking in several respects when compared to other regions of the Nation. There are seven existing public air carrier and 55 general aviation airports in the sub-region; only Birmingham and

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*/ Known locally as the Warrior River above Tuscaloosa, Alabama, and Black Warrior below the city.

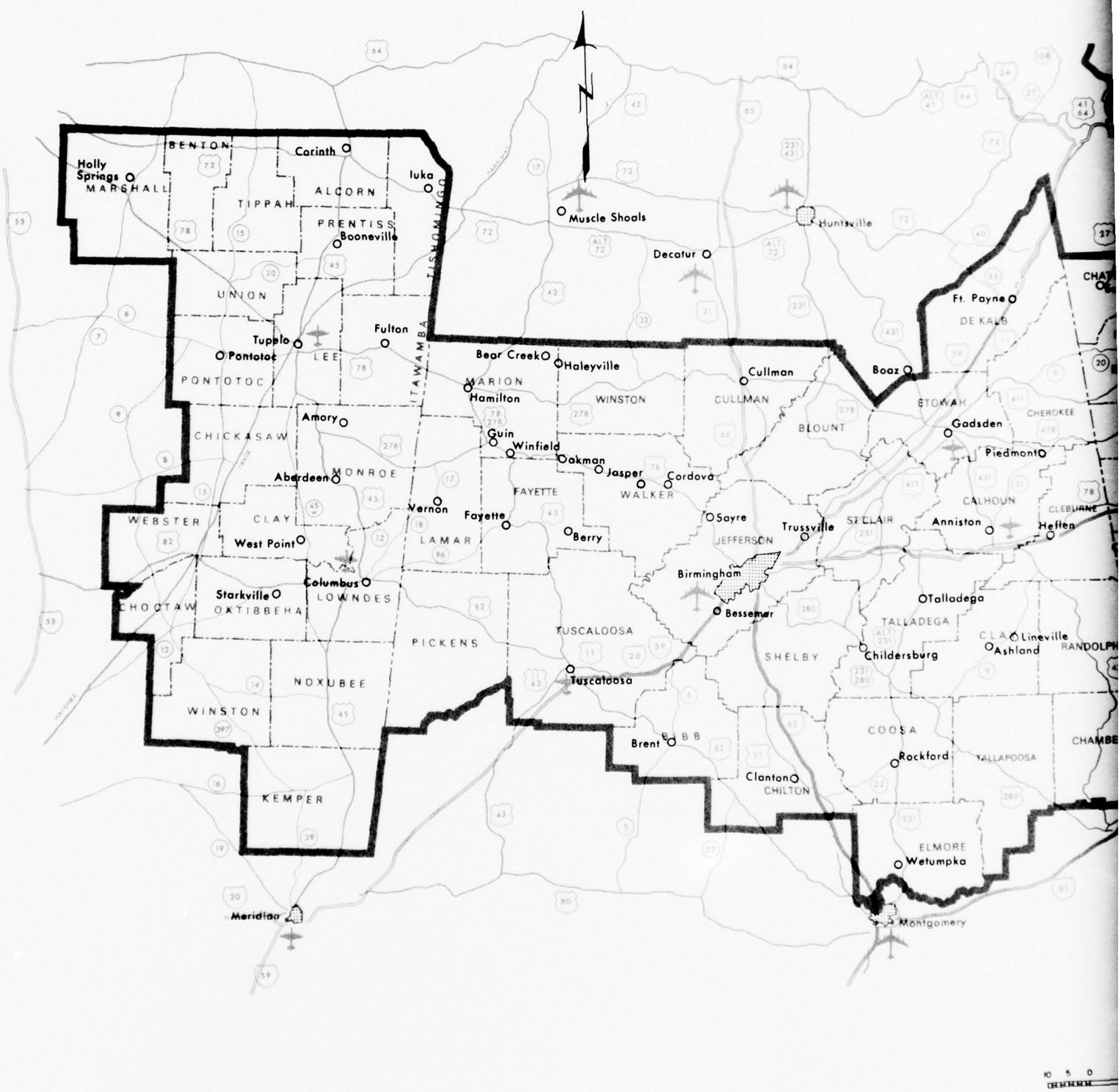
Tuscaloosa, however, have runways adequate for commercial-type jet-propelled craft. Only local service is currently provided at five of the air carrier airports and 12 of the general aviation facilities are classed as sub-standard. Locations of the larger airports are shown in Figure 9-4.

As in other regions of the Nation, pipelines constructed in the sub-region in the past several decades have had a significant influence on economic growth and development trends. The fuels thus transported have replaced much of the coal that once was mined in the central Alabama areas for industrial and domestic use, and have effected changes in the use or need for other types of transportation. Sub-region E is currently served by three major trunk pipelines, with several spur lines, which originate in Texas. Two of the trunk lines transport liquid petroleum products, such as gasoline and distillate fuels, and the other carries liquefied petroleum gas, or propane. The three lines have a combined rated capacity exceeding one million gallons per day.

Improvements to the transportation system that are now under construction, or planned, are discussed in the next three paragraphs. These improvements are also included in Figures 9-4 and 9-5.

Appalachian Highway Corridor A in northeast Georgia will connect Atlanta with Asheville, North Carolina, and other centers to the northeast in Appalachia and provide much-needed access to and from the north Georgia mountain area. All interstate routes presently planned for the sub-region, excluding the Mississippi portion, are now under construction. Interstate Routes 20 and 59 will connect Birmingham with Tuscaloosa and other cities to the west. From Birmingham, Route 20 will extend east to Atlanta and beyond, and Route 59 will continue northeastward to Chattanooga, Tennessee. Interstate Route 65 will connect Birmingham with Montgomery to the south and Nashville, Tennessee, to the north. Interstate Route 85 will generally skirt the sub-region from Montgomery to Atlanta then pass through the northeastern part in Georgia to Spartanburg, South Carolina, and other points. Interstate Route 75, connecting Atlanta and Chattanooga, will also traverse the Georgia area. The Natchez Trace Parkway, a valuable scenic route traversing the Mississippi area in a northeast-southwest direction, is complete in the sub-region except for a segment in the northeastern part of the State.

A navigation project being constructed on the Alabama River will provide a nine-foot-deep navigable channel from the Black Warrior and Tombigbee River Waterway at the head of the Mobile River to Montgomery, Alabama. The authorized Coosa River navigation project, when constructed, will extend the nine-foot navigation channel about 280 miles farther inland from Montgomery to Rome, Georgia. The Tennessee-Tombigbee Waterway, now in the advance planning stage, in the southwestern Alabama and northeastern Mississippi areas will provide a nine-foot-deep navigation channel connecting the Tennessee and Tombigbee Rivers. Advance planning is in progress for a new single-lift lock at John Hollis Bankhead Dam, the uppermost navigation structure on the Black Warrior and Tombigbee Waterway, which will replace an obsolete double-lift lock. The



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Columbus
LOWNDES
Starkville
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Jasper
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Muscle Shoals
Decatur
Huntsville
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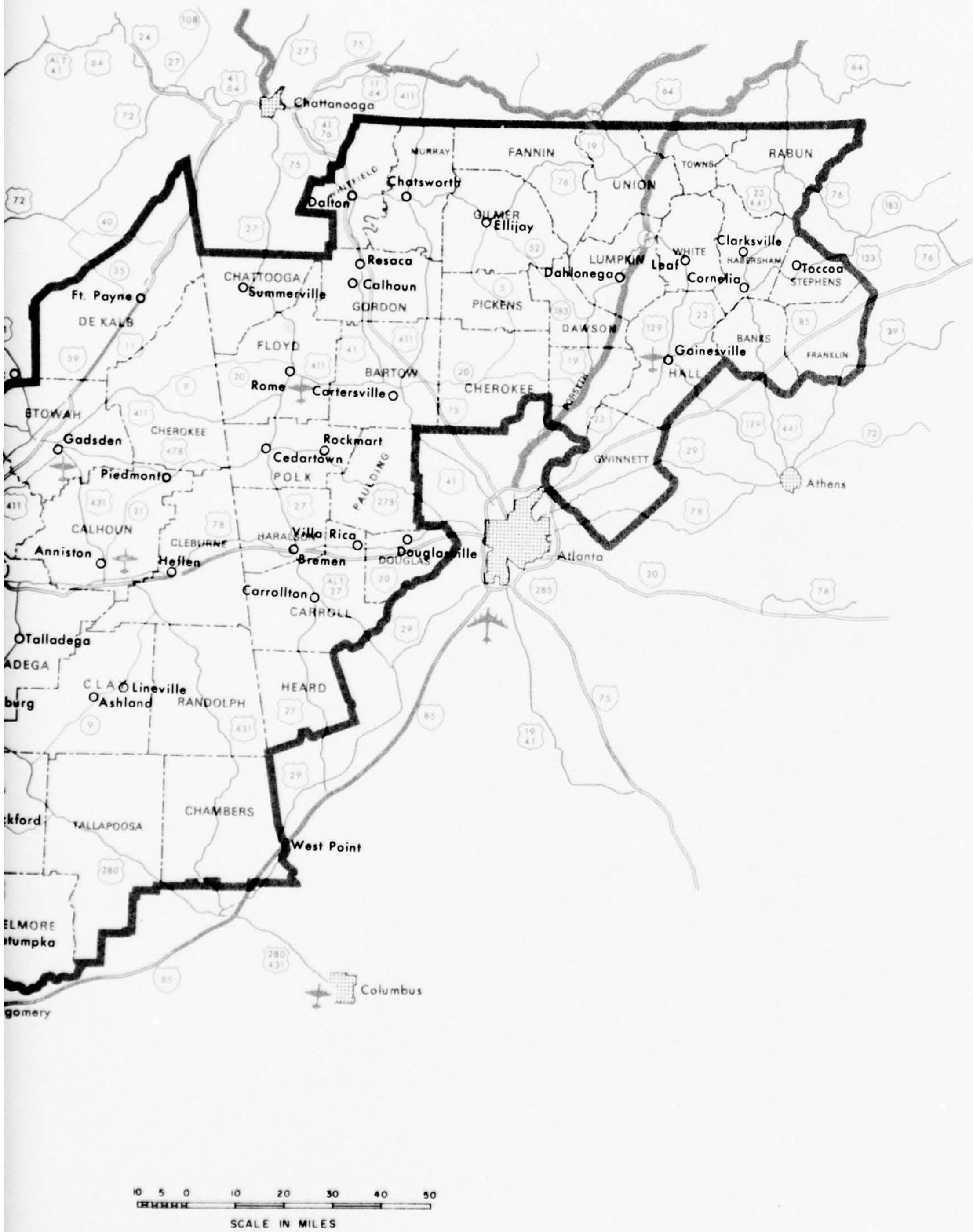

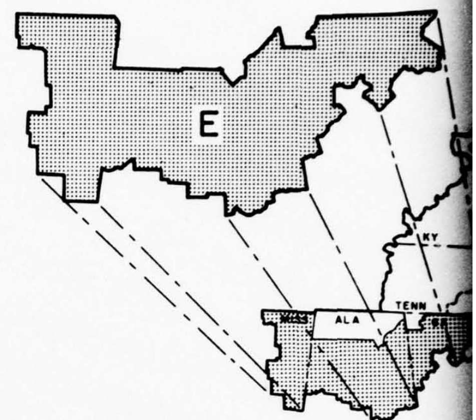

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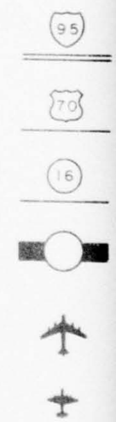

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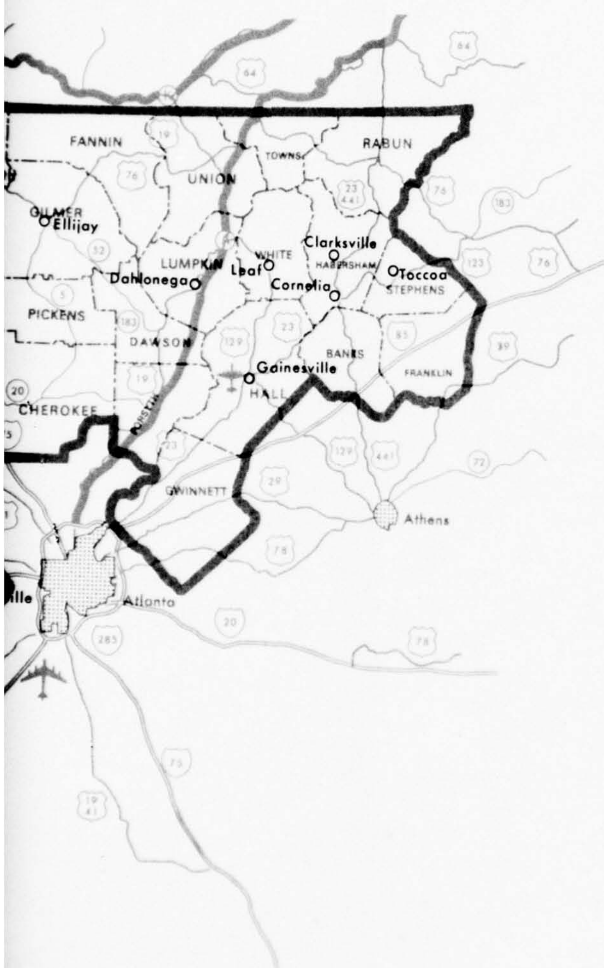

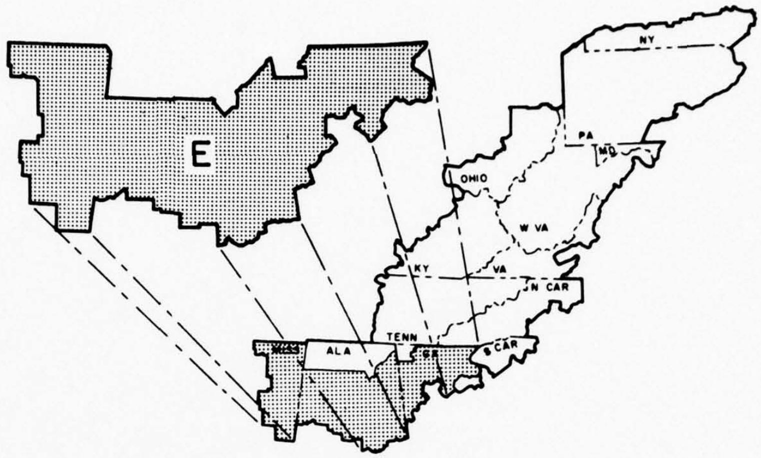

VICINITY MAP

LEGEND

- 95 Interstate Highway
- 70 Federal Highway
- 16 State Highway
- Appalachian Corridor
- Includes Jet Service
- Scheduled Prop Service

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HIGHWAYS & AIRPORTS

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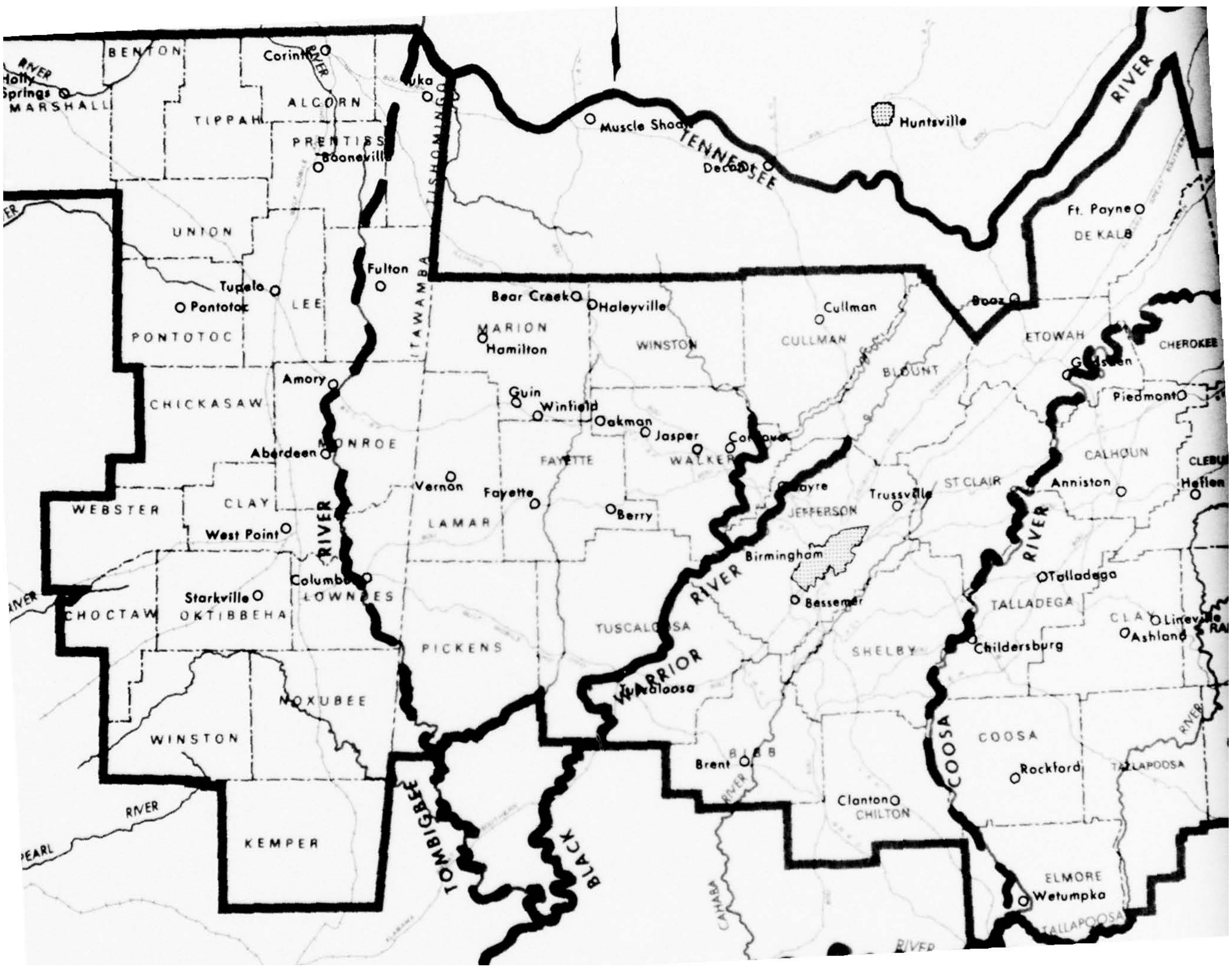
 FIGURE 9-4



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Ft. Payne
DE KALB
Tupelo
Pontotoc
LEE
PONTOTOC
Bear Creek
Haleyville
MARION
Hamilton
WINSTON
Cullman
CULLMAN
Boaz
ETOWAH
CHEROKEE
BLOUNT
Amory
CHICKASAW
Guin
Winfield
Oakman
Jasper
Piedmont
MONROE
Aberdeen
FAYETTE
WALKER
CALHOUN
Vernon
Fayette
Anniston
Heflin
WEBSTER
CLAY
Trussville
ST CLAIR
JEFFERSON
LAMAR
Berry
West Point
RIVER
Birmingham
Talladega
Starkville
LOWNDES
CHOCTAW
OKTIBBEHA
Bessemer
TALLADEGA
CLAY
Ashland
TUSCALOOSA
PICKENS
SHELBY
Childersburg
WARRIOR
RIVER
NOXUBEE
COOSA
Rockford
TALLAPOOSA
WINSTON
Brent
BIBB
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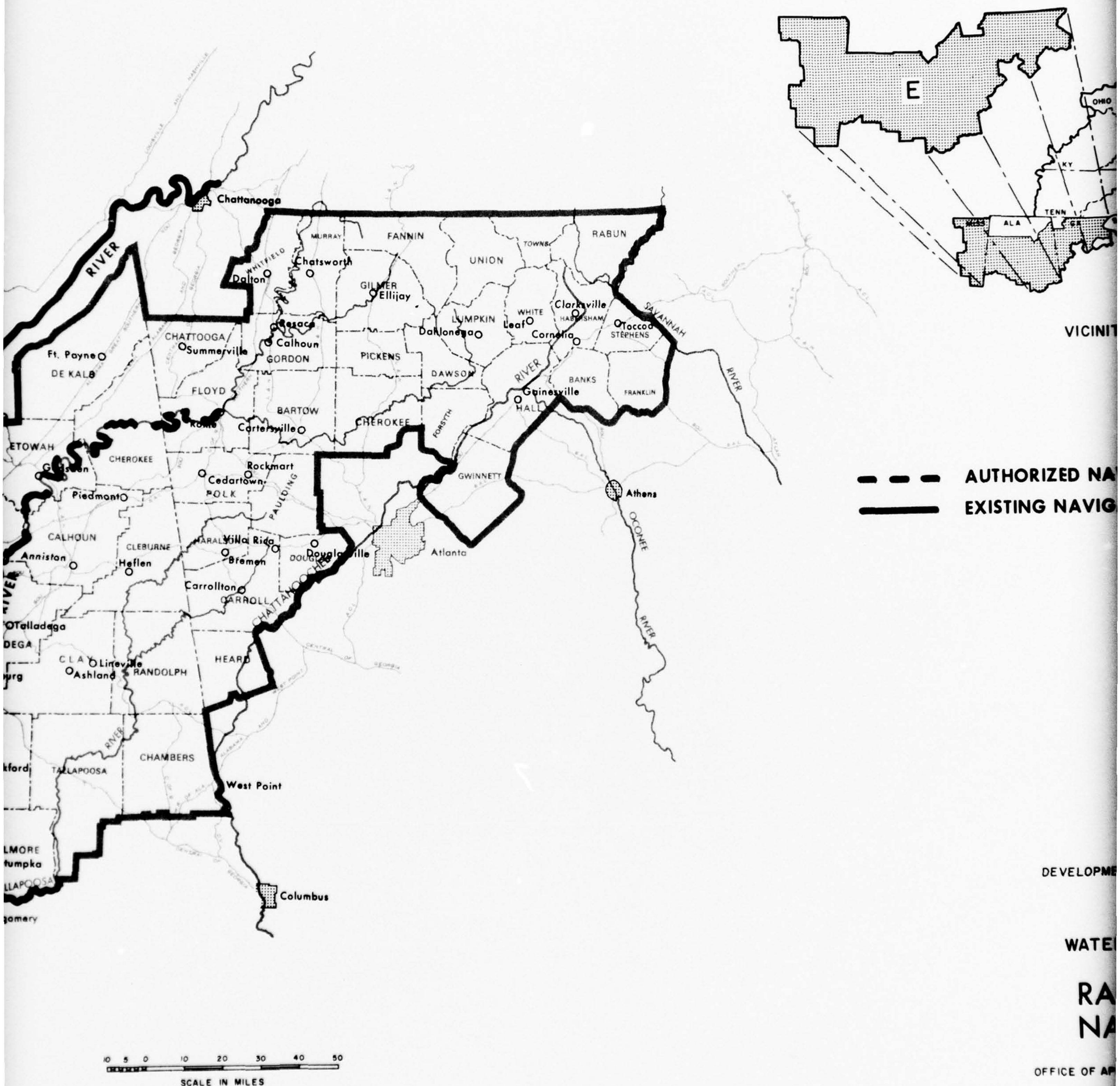

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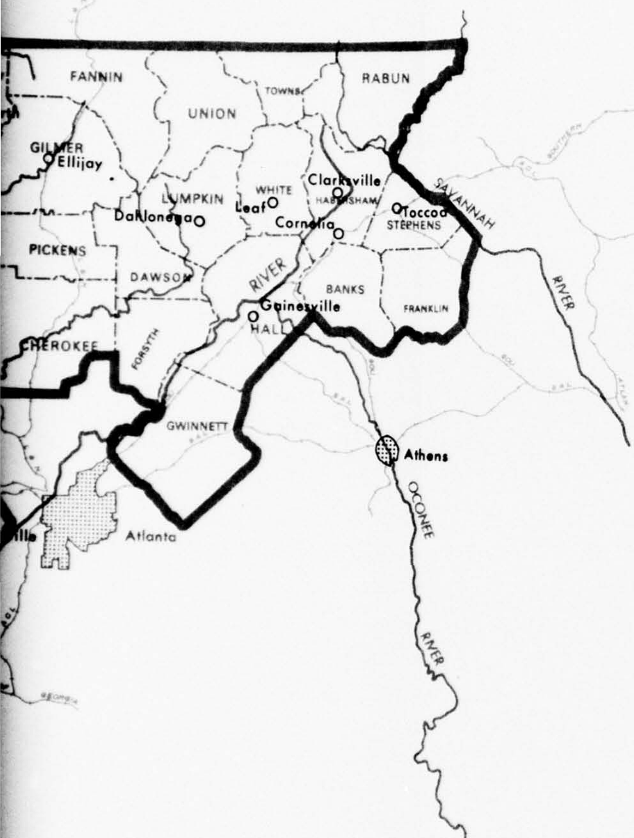

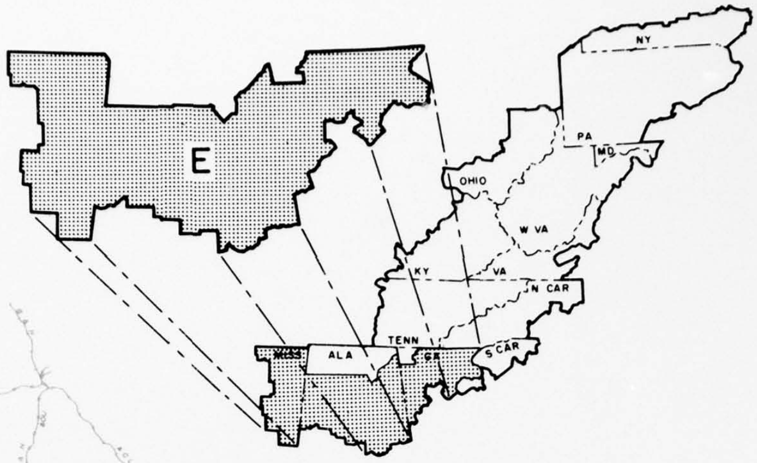

VICINITY MAP

AUTHORIZED NAVIGABLE WATERWAYS

EXISTING NAVIGABLE WATERWAYS

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WATER SUB-REGION E

RAILROADS & NAVIGATION

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FIGURE 9-5

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old lock has been in operation for more than 50 years and traffic has developed considerably greater than originally contemplated. The increased number of lockages to meet the demand has put a greater strain on the lock and has raised the probability of an accident that could lead to permanent structural failure. The site and construction of the new lock has been officially approved by the Corps of Engineers and the 1970 budget contains funds for further planning and for the initiation of construction. Feasibility studies for the replacement of the William Bacon Oliver Lock at Tuscaloosa should be completed and advanced planning and engineering well underway by 1980.

Much-needed improvements to existing air transportation facilities and the construction of new airports in the sub-region are planned or underway at several locations. These include improvement of an existing airport at Anniston in Alabama and a new airport to serve the Golden Triangle cities of Columbus, West Point and Starkville in Mississippi. In addition, new or improved but less elaborate airport facilities are planned in Bartow and Douglas Counties in Georgia and Webster, Itawamba, Tippah and Marshall Counties in Mississippi.

3. RESOURCES DEVELOPMENT

Human

In 1960, the sub-region contained nearly 2.5 million inhabitants with about one-half being located in the western 16 Alabama counties. Of the total population, almost evenly divided between urban and rural residents, 22 percent was in Georgia, 62 percent in Alabama and 16 percent in Mississippi. Rural non-farm residents comprised 40 percent of the total population and rural farm, 14 percent (See Figure 9-6). Of the total population of the United States at that time, 70 percent was urban, 23 percent rural non-farm and 7 percent rural farm.

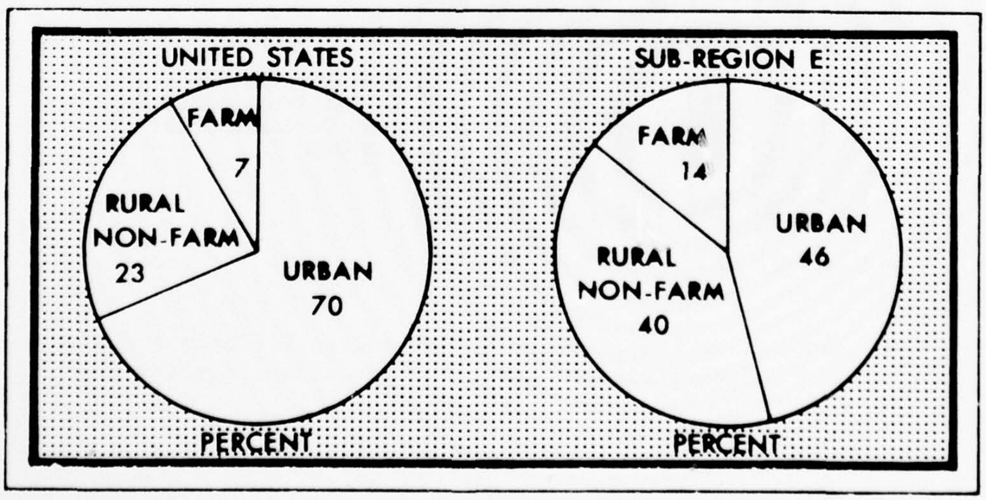

Figure 9-6. Distribution of Urban, Rural Non-Farm and Farm Population in Sub-region E Compared With the United States, 1960

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The age and sex characteristics of the population in 1960 illustrated in Figure 9-7, opposite page, compare favorably with those for the Nation as a whole. About 48 percent of the sub-region's population were under 25 years of age, 44 percent were in the age bracket from 25 to 65 and 8 percent were 65 and over. The sub-region had a slightly higher ratio of female-to-male population.

The educational level of the sub-region's population, well below the national average, has been a major factor tending to restrain economic growth and development. One-half of the adult population in 1960 had less than a high school education; the national average was less than 40 percent. About 10 percent had completed one or more years of college education as opposed to 17 percent for the Nation as a whole. Only 4.7 percent were college graduates compared to the national average of 7.1 percent at that time. The population distribution of the sub-region and the United States by educational attainment is shown below in Figure 9-8.

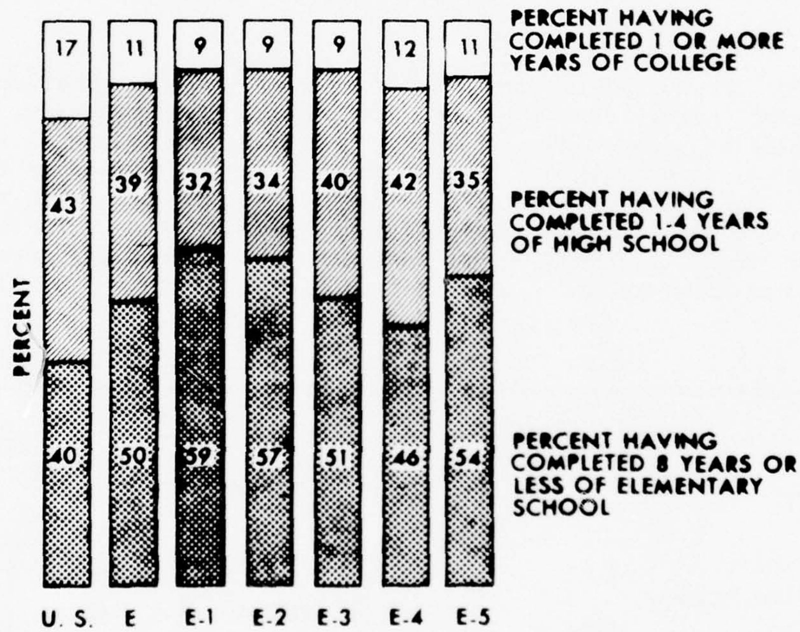


Figure 9-8. Population Distribution of Sub-region E, Water Areas and the United States in 1960, by Educational Attainment

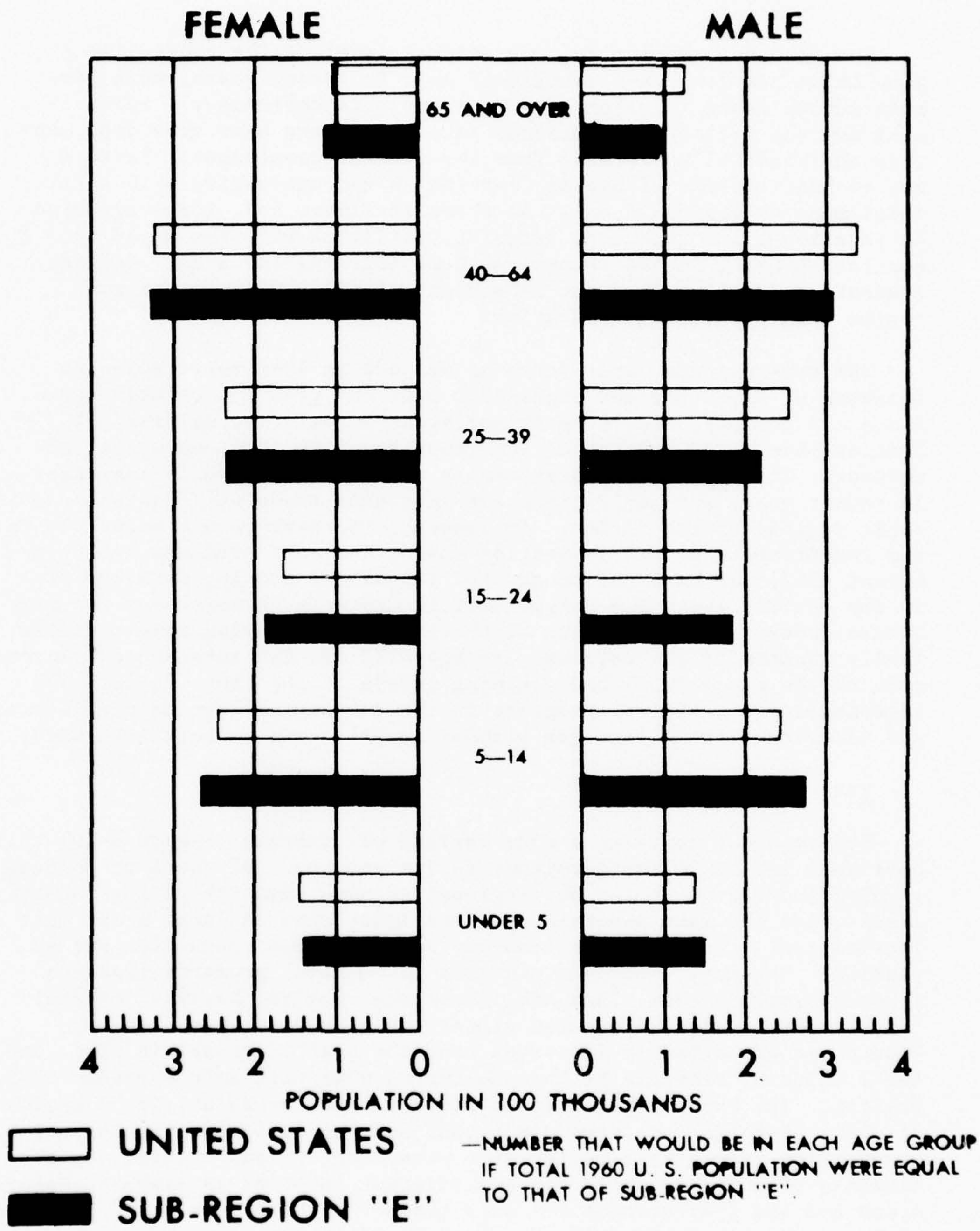


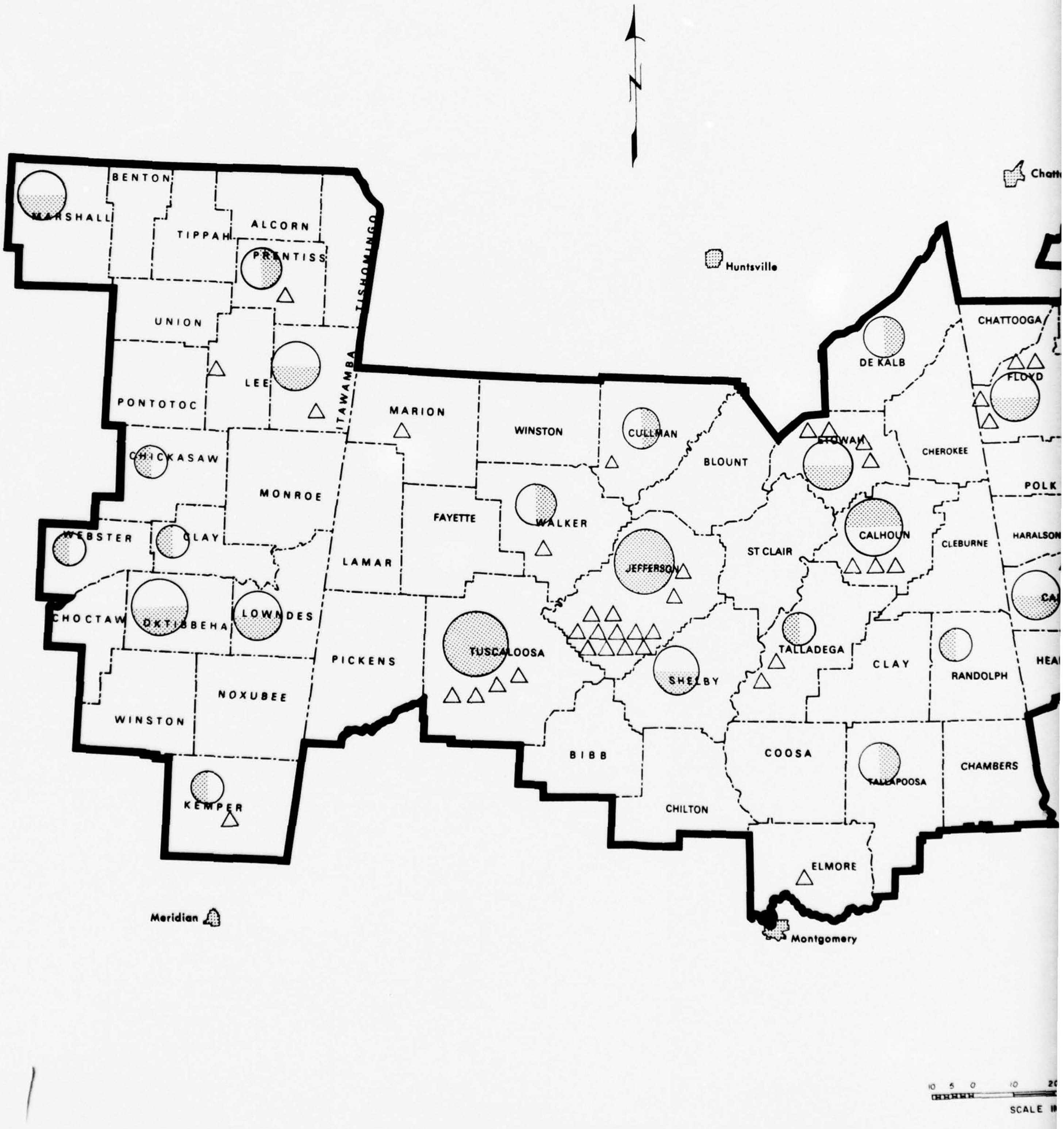
FIGURE 9-7 POPULATION DISTRIBUTION BY AGE AND SEX

The need for raising the educational level of the sub-region's population has long been recognized and, in recent years, much has been accomplished in efforts to overcome this deficiency. Substantial new and expanded educational facilities have been provided, many through financial assistance from the Federal government. There are now 44 institutions of higher learning in the sub-region with a total enrollment exceeding 58,000. As shown in Figure 9-9, there are also 46 vocational and technical training facilities with the major concentration being in the central Alabama (Birmingham) area. College students currently represent 39 percent of all adults in the sub-region with any college education.

The sub-region's labor force of 923,800 in 1966 represented an increase of eight percent since 1960 with the greatest relative gain, almost 14 percent, occurring in northwest Georgia (Water Area E-2). Females made up 32 percent of the labor force in 1960 and males, 68 percent. The ratio of female-to-male workers has steadily increased in recent years and indications are that this trend will continue as in other regions of the Nation. In general, the workers are adaptable to the requirements of new industries moving into the area and their inherent abilities have influenced the industrial growth, particularly in the rapidly expanding tufted textile industry in northwest Georgia. Future industrial development of the higher wage-paying type to raise family incomes to the national average will require substantial improvement of the educational and training levels of the labor force. The vocational and technical programs in the sub-region have been accelerated and additional facilities are planned in all areas to meet this need.

Minerals

Sub-region E contains a wide variety of minerals (Figure 9-10) that have been and still are important to its economy. Of equal or perhaps greater importance to the sub-regional economy than the mining industry itself, are the many mineral-dependent industries in local areas that require coal, non-metals or iron ore for continued production and expansion. The more important minerals and mineral products that are produced include coal, iron ore, limestone, barite, bauxite, natural clays, cement, mica, dimension stones, talc, and sand and gravel. Production has steadily increased over the past 15 years; in 1965, the total value of minerals of the sub-region that were sold exceeded $200 million. The overall increase in production occurred despite a decrease of about 75 percent in iron ore output between 1961 and 1965 because of competition from ores imported from other regions and foreign sources. Minerals produced in Jefferson and adjacent counties in Alabama (Water Areas E-3 and E-4) account for over three-fourths of the total production of the sub-region. Many of the minerals and mineral products are exported to regions bordering the Gulf of Mexico and some are marketed nationally. The long-range forecast is for a continuing increase in mineral production, except for iron ore. There are large reserves of most minerals that are now produced, including iron ore, except for many of the higher-grade near-surface iron ores which are depleted. The Bureau of Mines in Appendix I, discusses in more detail the mineral resources of the sub-region.



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PICKENS
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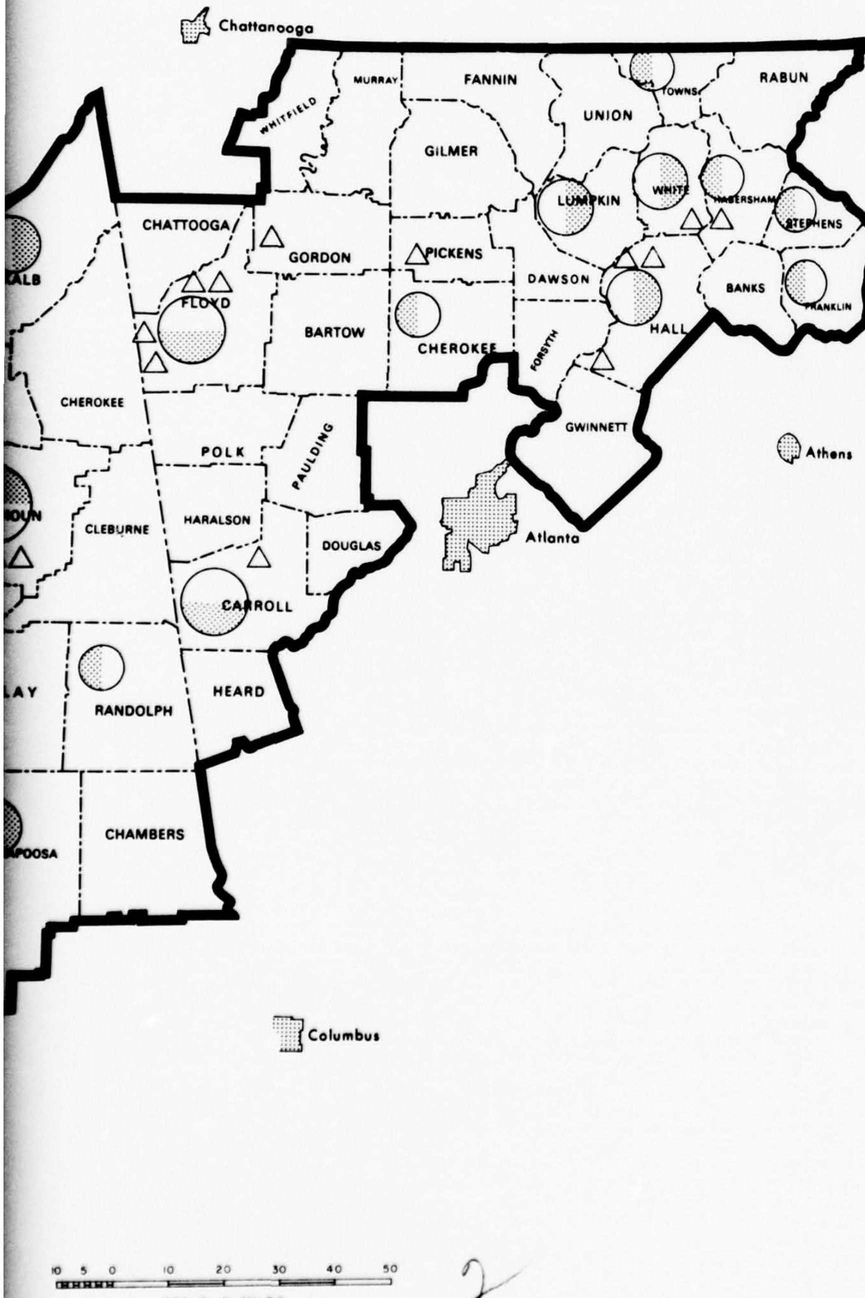

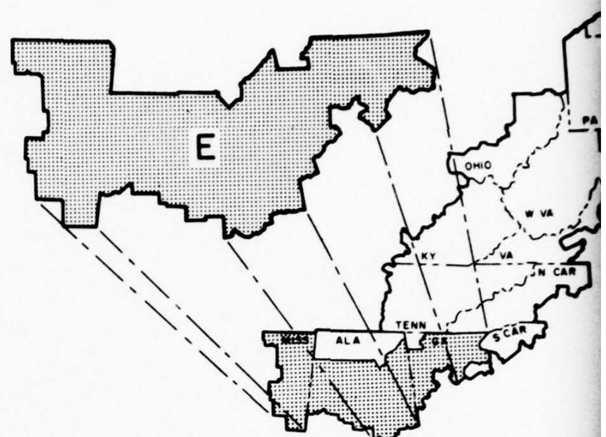

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◯	**1,000 — 3,999**
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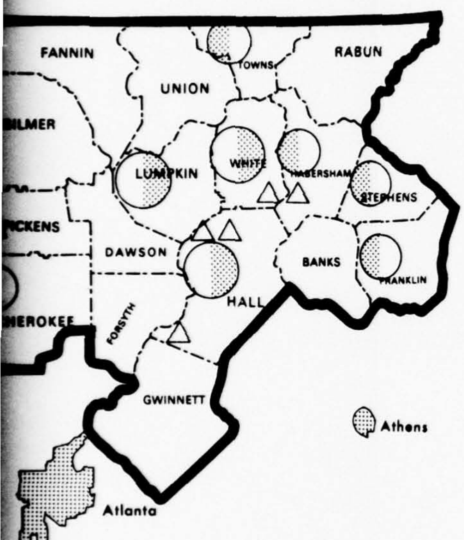

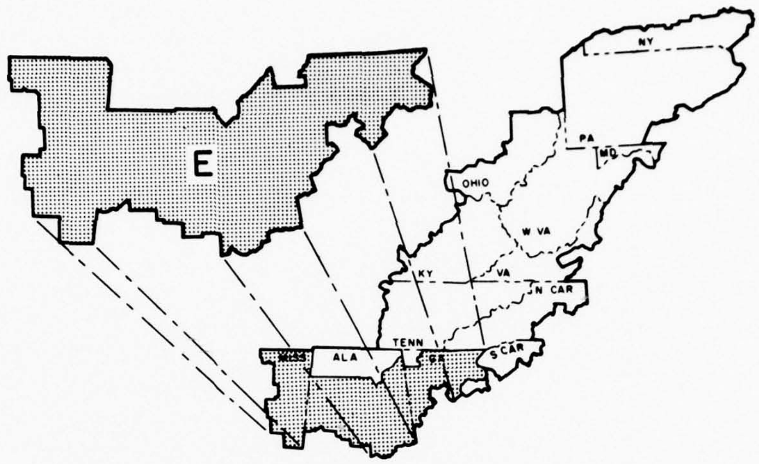

VICINITY MAP

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1966 ENROLLMENT AT INSTITUTIONS OF HIGHER LEARNING

- OVER 10,000
- 4,000 — 9,999
- 1,000 — 3,999
- 500 — 999
- 200 — 499
- △ VOCATIONAL AND TECHNICAL EDUCATIONAL FACILITY

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IN
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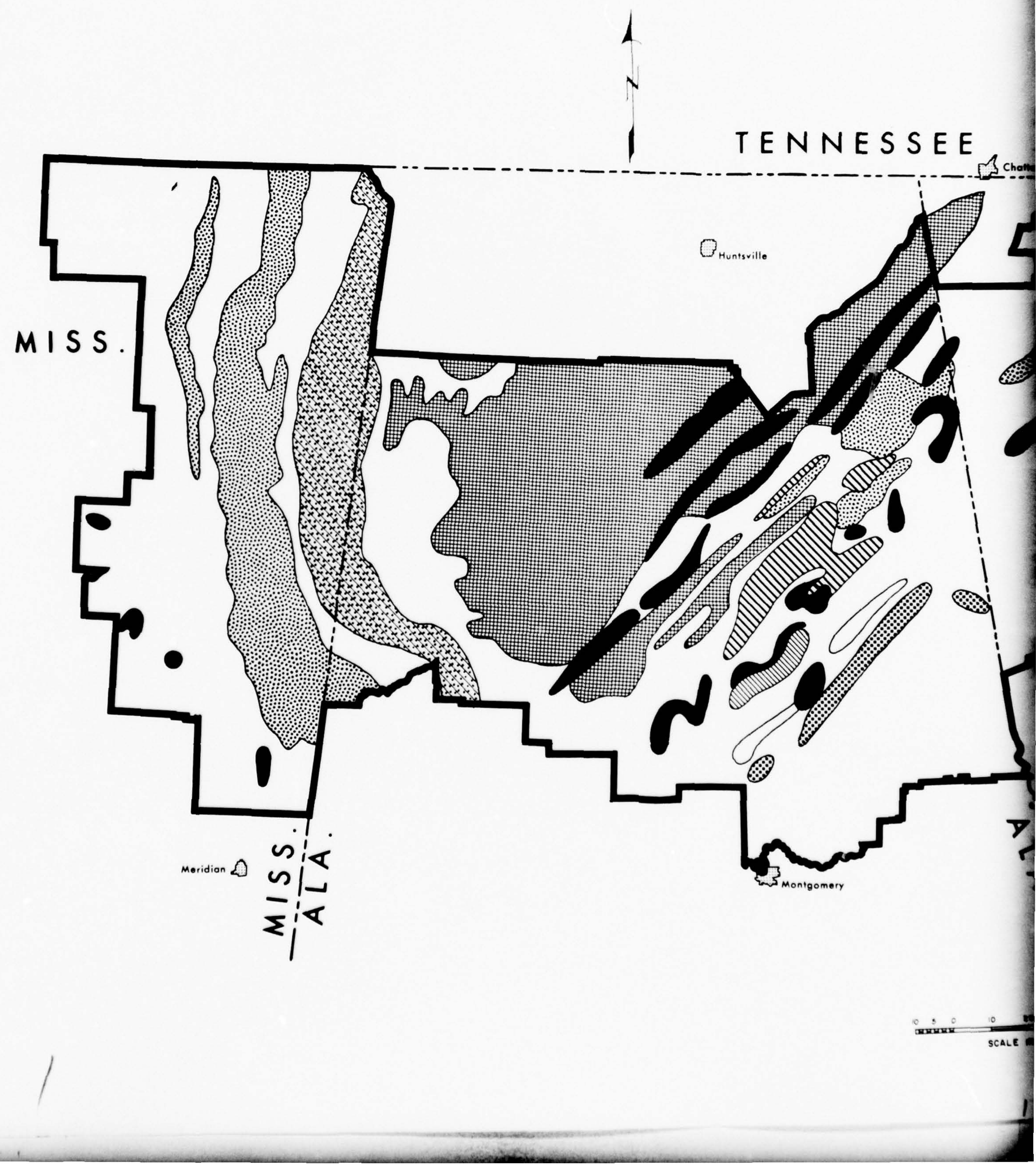
 FIGURE 9-9



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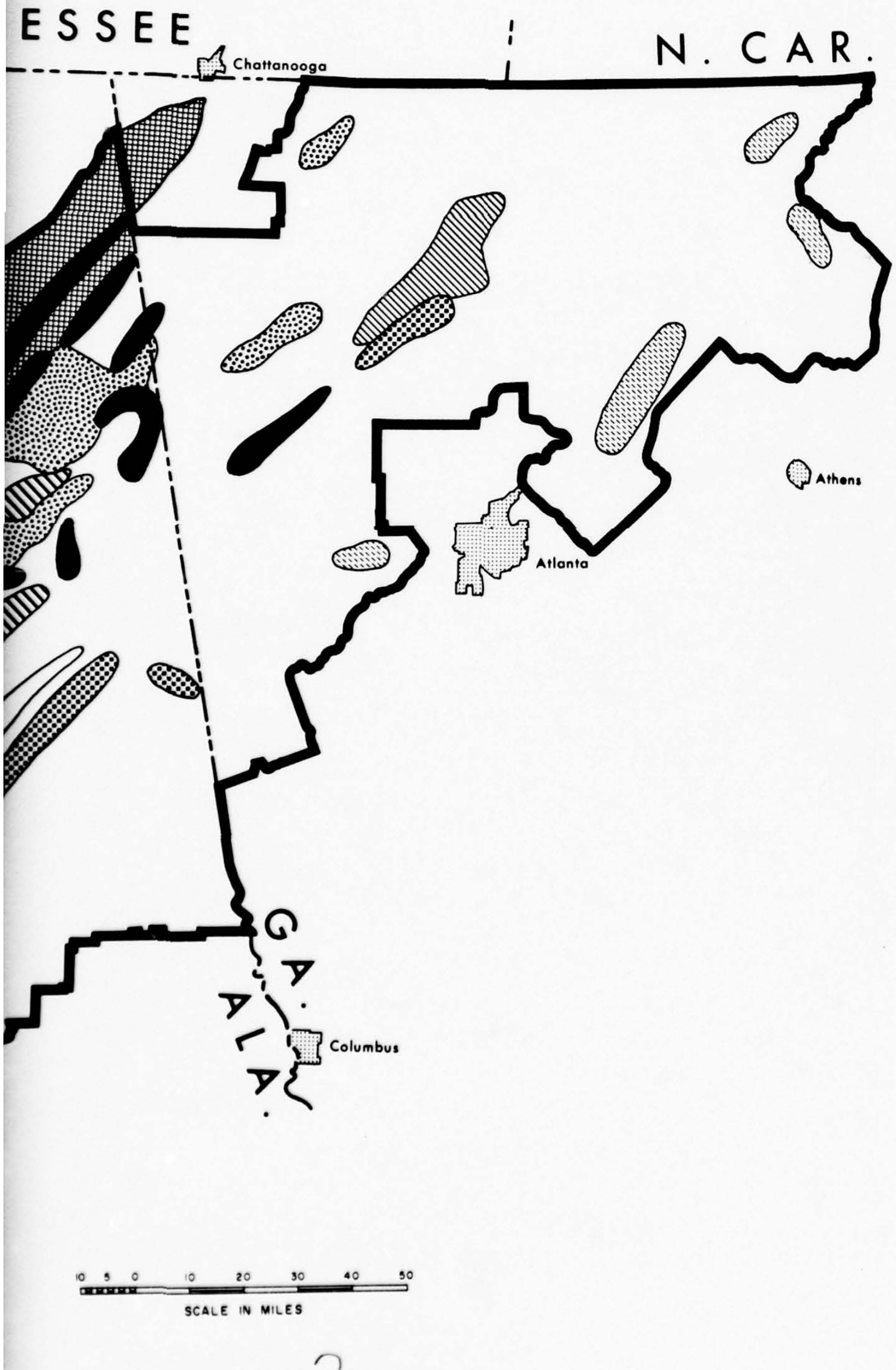

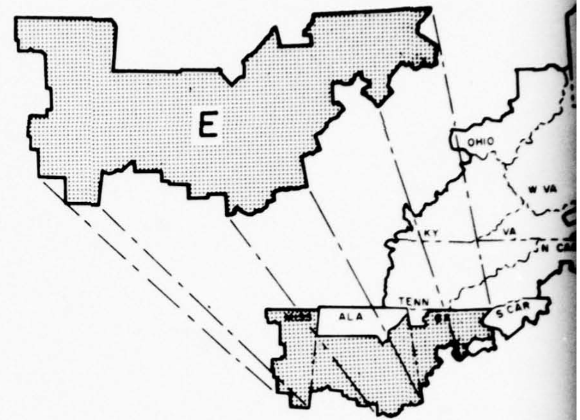

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NOTE: Mineral locations in Georgi description of the mineral producti The Mineral Industry of Georgia.

- GRAPHITE
- COAL
- *GRANITE*
- SAND & GRAVEL
- LIMESTONE
- MARBLE
- IRON ORE
- DOLOMITE
- MICA

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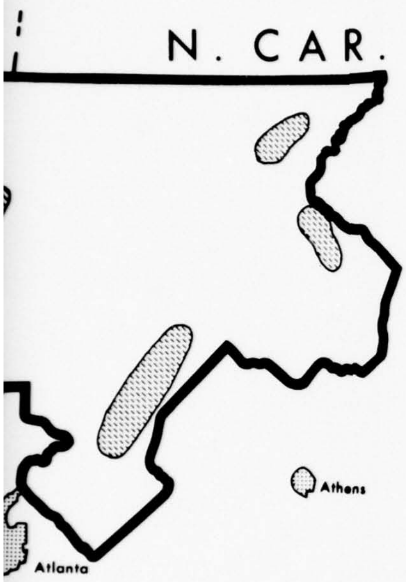

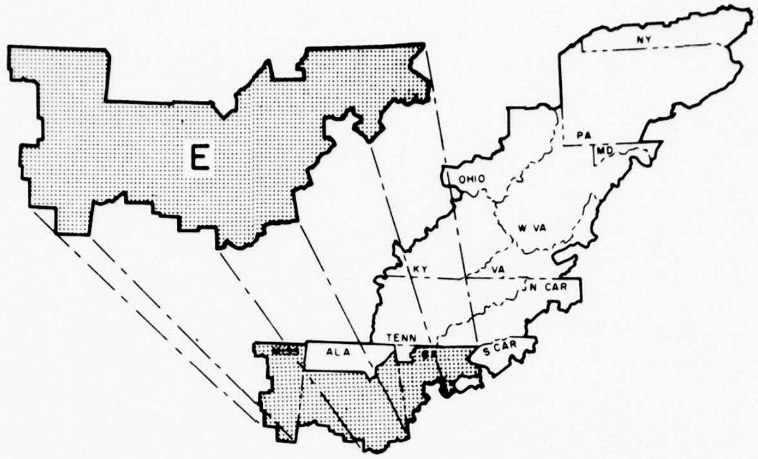

VICINITY MAP

LEGEND

NOTE: Mineral locations in Georgia are estimated from description of the mineral production in 1966 as given in The Mineral Industry of Georgia.

- **GRAPHITE**
- **COAL**
- **GRANITE**
- **SAND & GRAVEL**
- **LIMESTONE**
- **MARBLE**
- **IRON ORE**
- **DOLOMITE**
- **MICA**

REPORT FOR
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IN
APPALACHIA

WATER SUB-REGION E

MINERALS

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 FIGURE 9-10

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Lands

The total agricultural land area of the sub-region is 24,388,200 acres. The present land use is as follows: cropland 3,720,500; pasture 2,115,700; state and private forest and woodland 15,022,700; and other land 1,310,000. In addition, there are 1,195,900 acres of National Forest land in the sub-region. As shown below in Figure 9-11, during the period 1949-1964, the land in farms, number of farms, and acres of cropland have declined 33, 56 and 47 percent, respectively, while the average size farm increased 49 percent.

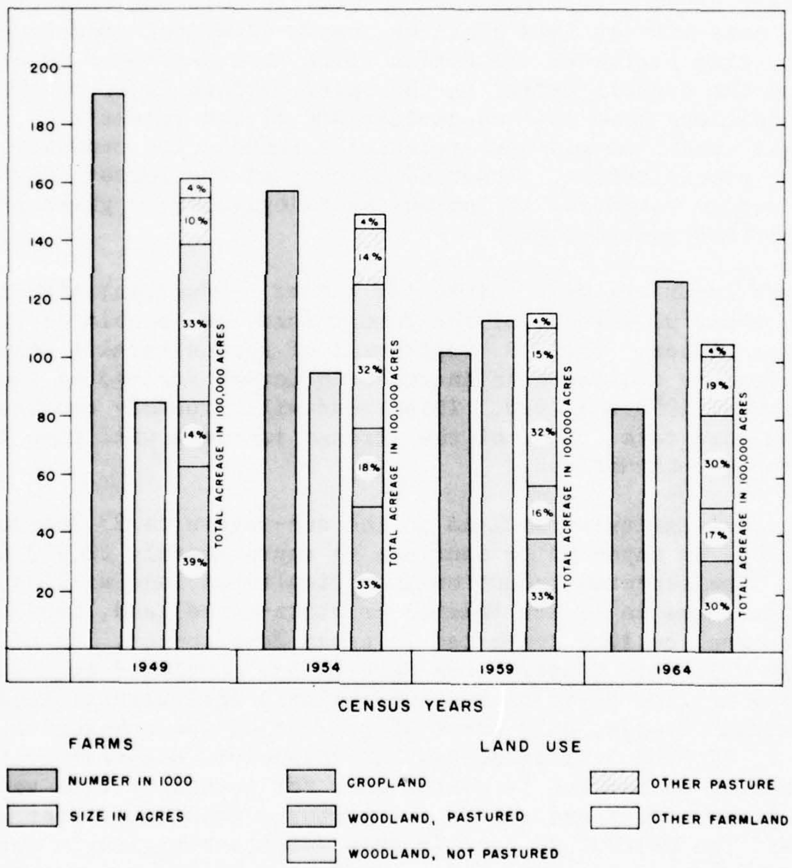

Figure 9-11. Agricultural Land Use Trends in Sub-region E, 1949-1964

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The non-agriculture land, amounting to 1,023,400 acres, includes other federal land, urban and built-up areas, water areas less than 40 acres in size, and streams less than one-eighth mile wide. This amounts to 101,000 acres or about 0.4 percent of the total land area. This includes farm ponds and small upstream watershed structures for recreation, fish and wildlife, irrigation, and water supply which amounts to 63,980 acres. In addition, the U.S. Forest Service has constructed and developed in Alabama three lakes totaling 78 surface acres for public fishing and recreation.

Approximately two-thirds of the sub-region is in forest and woodland. The principal forest cover types are oak-pine and southern pine. The present cover serves reasonablly well to hold the soil in place. However, past misuse, land clearing, heavy livestock grazing, poor timber cutting practices and forest fires have destroyed much of the humus and the organic matter in the upper surface layer of the soil. These conditions have left three-quarters of the forest land in a poor hydrologic condition and have materially reduced its capacity to absorb and store precipitation. About 60 percent of the forest land has a high to medium potential to improve hydrologically if given proper management and protection.

Forest lands are well suited for timber production; almost every acre, or about 99 percent of the forest land, is capable of producing commercial timber. The U.S. Department of Agricultural's Conservation Needs Inventory indicates an increase in forest acreage of about 13,000 acres between 1958 and 1975. This trend will probably continue at about the same rate. Most of the acreage increase will come from abandoned crop or pastureland.

The total agricultural land in the sub-region is 23,364,800 acres. This acreage is expected to decrease to approximately 22,903,600 acres by 1975. The expected reduction in agricultural land will be mainly due to increases in either federal or state-owned land, land occupied by reservoirs, or land converted to urban development. As of June 30, 1967, the U.S. Soil Conservation Service has completed soil surveys on about 18.5 million acres of the sub-region's agricultural land. Of the inventorical acreage, only about 36 percent of the sub-region (capability Classes I, II, and III) is suited for intensive long-term cultivation. The remaining 63 percent is suited only for permanent type vegetation such as grass, trees and shrubs for pasture, grazing, forest and wildlife purposes. The percent of land in this water sub-region in each of the capability classes is shown below, in Figure 9-12.

Sub-region E has not been subject to the physical ravages of extensive mining as have some of the other parts of Appalachia. The Secretary of the U.S. Department of Interior, in a report to the Appalachian Regional Commission, estimated that about 19,000 acres have been disturbed. As of 1 January 1965, 2,200 acres were unreclaimed and 11,800 partially reclaimed.

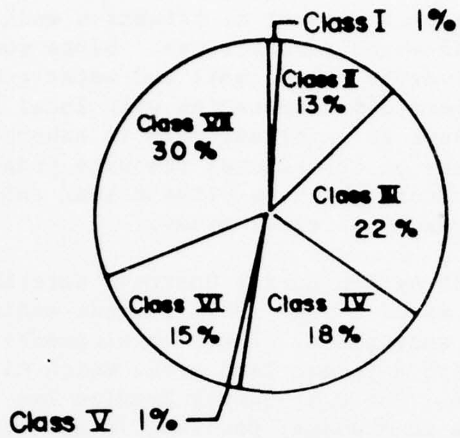


Figure 9-12. Distribution of Sub-region E Agricultural Lands by USDA Land Capability Classes (Includes Only Land Inventoried To Date)

Environmental Aspects

The scenic and aesthetic features of the sub-region vary widely with the most outstanding being the mountains in north Georgia. Summers in this area are relatively cool in comparison with the Coastal Plain and other areas to the south and southwest. The vividly contrasting colors of the autumn foliage lining the mountain sides and the valleys, and the crystal-clear streams with occasional low waterfalls and rapids attract nature lovers from throughout the southeast. Although the surroundings provide magnificient settings for manmade reservoirs, careful planning for these developments must be exercised to preserve as much as possible of the natural scenic beauty. In contrast, reservoirs constructed in the less spectacular regions to the south and southwest are less likely to detract from the scenic values.

Some scenic attractions are Little River Canyon and Bee Branch in Alabama, Brasstown Bald in Georgia and the Chattahoochee, Coosa, and Black Warrior Rivers. The Natchez Trace Parkway, the Horseshoe Bend National Military Park, the Tupelo National Battlefield and the Brices Cross Roads National Battlefield sites are also located within the sub-region as well as several state parks. Figure 9-13 shows the location of scenic and historical sites and National Forests. Extension of the Blue Ridge Parkway into 6 counties in northeast Georgia as authorized by Congress during the 90th Session will be a major improvement in the sub-region's environmental quality.

Natural beauty is a normal product of effective soil and water conservation practices and sound resource use. Since most of the land in this sub-region is privately owned, soil and water conservation work done by landowners and operators cooperating with local Soil Conservation Districts often plays an important role in enhancing scenic beauty of the Region. Many of the natural resource programs of the U.S. Department of Agriculture, both on private land and National Forests, add to the scenic beauty of rural areas.

The U.S. Department of Agriculture's Upstream Watershed Projects authorized for operation as of 1 July 1967, include additional storage and developments for recreation. These developments provide 2,892 acres of water surface with adjacent land area, which will accommodate 320,695 recreational days. The U.S. Forest Service has constructed and developed three lakes in Alabama, totaling 78 surface acres for public fishing and recreation. In addition, there are 48,961 farm ponds with water surface of 58,020 acres. Some of these ponds are used as income-producing recreational enterprises but are most commonly limited to the use of the farm owners and their friends.

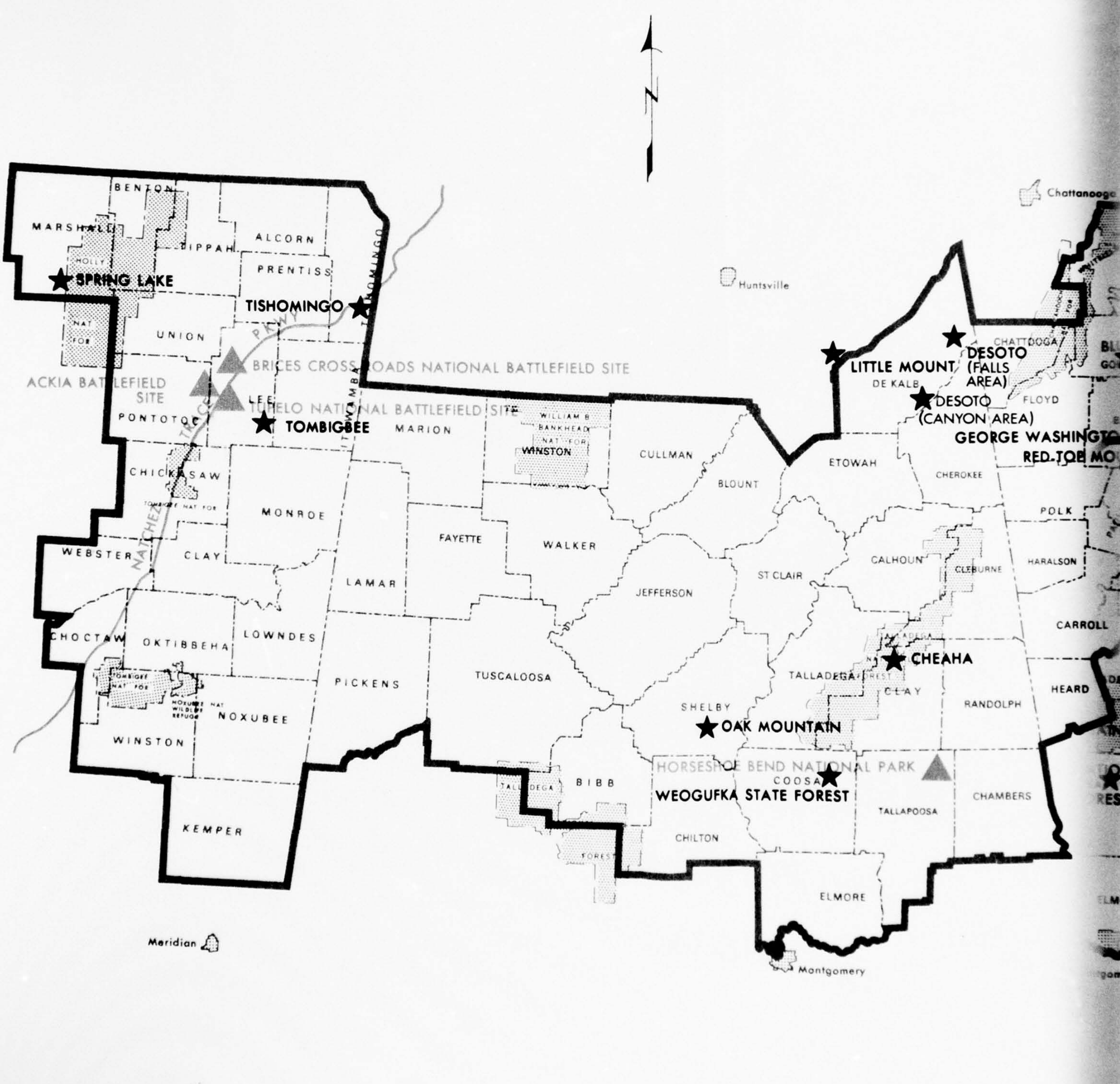
Most of this area is in forests and woodlands interspersed with farms. The northern part is heavily forested, well suited to deer, and in the least disturbed areas to turkey and black bear. Fishing is primarily for large-mouth bass, perch, and other warm-water species.

A total of 11,343 farm ponds are being stocked and managed for the production of fish, primarily of the warm-water species.

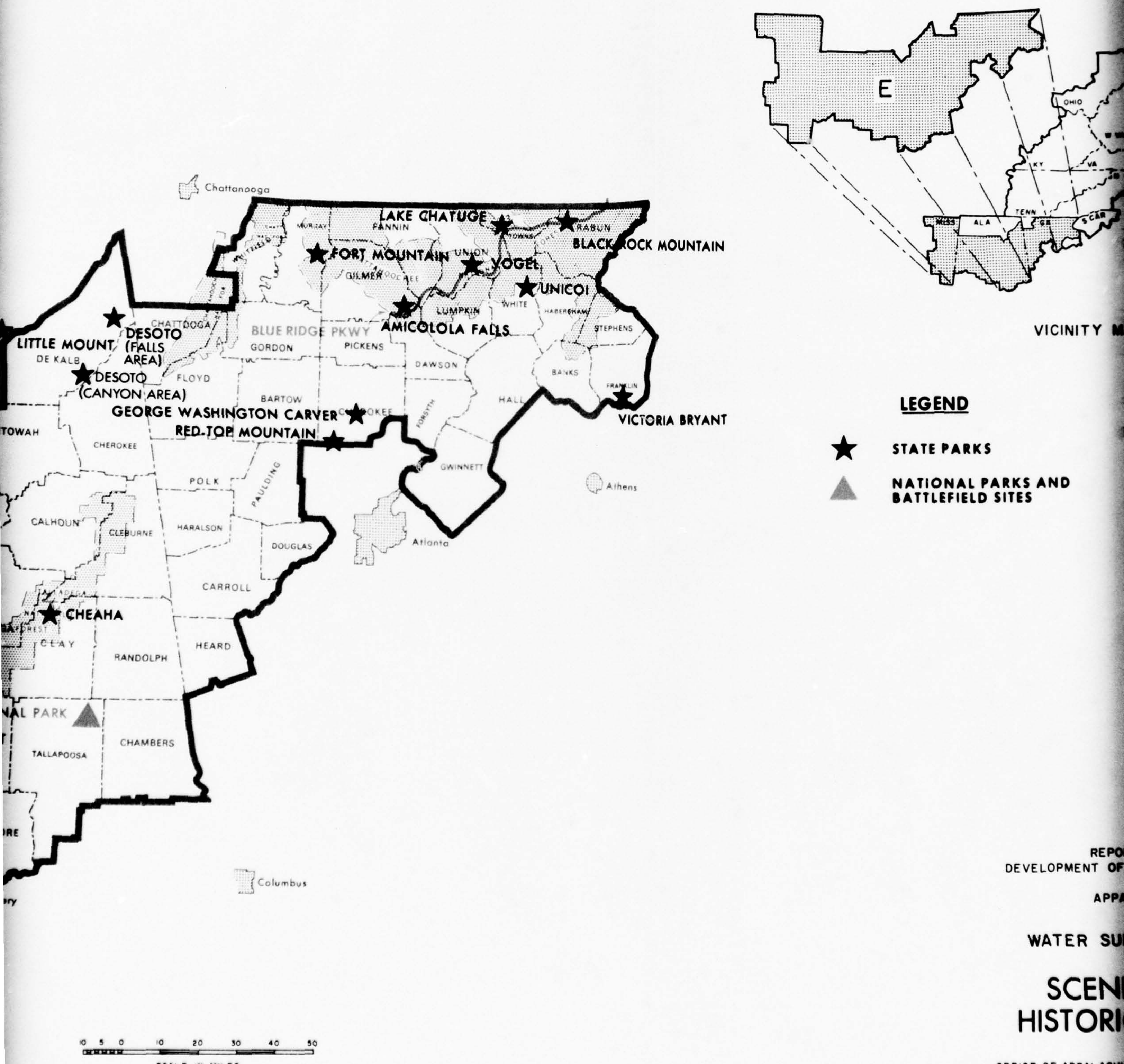
Two results of putting into effect individual basic conservation plans covering about 7,493,900 acres by 57,725 landowners and operators are land use changes of 55,000 acres being converted to wildlife and recreational uses and 449,339 acres being developed for wildlife habitat.

Deer, turkey, grouse, and squirrel are harvested annually in the Bankhead, Talladega, and Chattahoochee National Forests. Limited quail hunting is provided in the southern section of National Forest lands in Alabama. Limited funds have prevented extensive habitat development, but deer habitat has benefited from coordinated timber and wildlife management programs. Trout stocking and fishing continue to increase in the forests of northern Georgia. Warm-water fisheries are good throughout the sub-region.

Public-owned forest land in the water sub-region also provides substantial opportunities for outdoor recreation. During 1966, about 1,486,800 recreational visits were made to National Forests with an estimated 9,794,800 visits to State Forests.



Chattanooga
Huntsville
SPRING LAKE
TISHOMINGO
BRICES CROSS ROADS NATIONAL BATTLEFIELD SITE
ACKIA BATTLEFIELD SITE
TUPELO NATIONAL BATTLEFIELD SITE
TOMBIGBEE
LITTLE MOUNT
DESOTO (FALLS AREA)
DESOTO (CANYON AREA)
GEORGE WASHINGTO
RED TOP MO
CHEAHA
OAK MOUNTAIN
HORSESHOE BEND NATIONAL PARK
WEOGUFKA STATE FOREST
NATCHEZ TRACE PKWY
BENTON
MARSHALL
TIPPAH
ALCORN
PRENTISS
TISHOMINGO
UNION
PONTOTOC
LEE
ITAWAMBA
CHICKASAW
MONROE
WEBSTER
CLAY
CHOCTAW
OKTIBBEHA
LOWNDES
WINSTON
NOXUBEE
KEMPER
MARION
LAMAR
FAYETTE
PICKENS
WALKER
TUSCALOOSA
WINSTON
CULLMAN
BLOUNT
JEFFERSON
ST CLAIR
SHELBY
BIBB
CHILTON
ETOWAH
DE KALB
CHEROKEE
CALHOUN
CLEBURNE
TALLADEGA
CLAY
RANDOLPH
COOSA
TALLAPOOSA
CHAMBERS
ELMORE
CHATTOOGA
FLOYD
POLK
HARALSON
CARROLL
HEARD
Meridian
Montgomery
SCALE IN MILES



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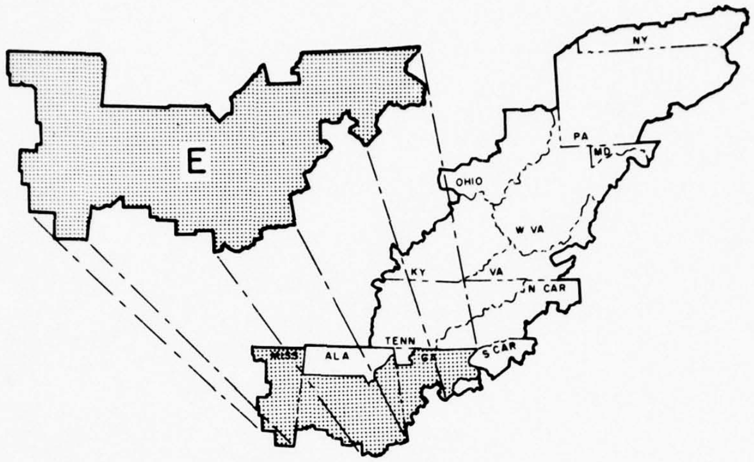

VICINITY MAP

LEGEND

★ STATE PARKS

▲ NATIONAL PARKS AND BATTLEFIELD SITES

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

SCENIC AND HISTORICAL SITES

OFFICE OF APPALACHIAN STUDIES JUNE 1968

3

 FIGURE 9-13

Water Resource Development - Federal

Corps of Engineers

Reservoir Projects. The Hartwell Dam and Reservoir, which is partially in the sub-region, is located on the upper Savannah River, 89 miles above Augusta, Georgia. The project provides flood control, hydroelectric power, low flow augmentation and recreation uses.

Buford Dam and Lake Sidney Lanier, a multiple-purpose development with hydroelectric power facilities located on the Chattahoochee River, is effective in reducing high river stages at Atlanta and, to a lesser extent, to areas farther south. Lake Sidney Lanier provides Atlanta with water supply and contributes to a highly successful recreation area.

Allatoona Dam and Reservoir, on the Etowah River generates hydroelectric power and provides flood protection for areas located entirely within Sub-region E, including the Rome, Georgia growth area. The reservoir also furnishes extensive recreational opportunities.

Carters Dam now under construction by the Corps of Engineers in north Georgia on the Coosawattee River, a headwater tributary of the Coosa River, is planned for completion in 1973. It will have facilities for flood control, hydroelectric power and recreation. Flood storage in the reservoir will furnish a high degree of flood protection along the Coosawattee River and, to a lesser extent, along the Oostanaula River, including urban areas at Calhoun and Rome, and in the upper reaches of the Coosa River extending into eastern Alabama. A low dam is being constructed a short distance downstream from Carters Dam to reregulate the discharge for hydroelectric power generation at the project. This in turn will improve water quality in the Oostanaula River and upper reaches of the Coosa by providing for low flow augmentation on a planned release basis.

West Point Dam on the Chattahoochee River scheduled for completion in 1973 will also have storage for flood control, hydroelectric power and recreation. This project, located partially in the sub-region in the southeast portion in Georgia and Alabama, will reduce flooding at West Point, Georgia, several miles downstream from the dam, and at the smaller adjacent populated centers of Lanett, Langdale and Riverview in Alabama. Some reduction in flooding will also be afforded even farther downstream on the river to the south and east of the sub-region at Columbus, Georgia, and Phoenix City, Alabama. Pertinent data on reservoir projects are shown in Table 9-4 and their locations in Figure 9-14, Page II-9-47.

Local Protection Projects. In addition to protection provided by flood storage in Allatoona Reservoir, the Fourth Ward section of Rome is protected by a system of levees constructed by the Corps of Engineers. Other Corps of Engineers' local flood protection projects, including levees and channel improvements, which provide protection primarily for urban development are at Gadsden, Glencoe, Clanton, Collinsville and Trussville in Alabama and at Columbus, Mississippi. In addition to these projects, the Corps has made stream channel improvements in all three state areas primarily for protection of agricultural land. There are

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substantial programs of this nature in the highly agriculturalized Mississippi and western Alabama portions of the sub-region. The projects as authorized by the Flood Control Act of 3 July 1958 (PL 85-500, 85th Congress) are expected to be completed by 1980. Local protection projects affecting urban centers and agricultural lands are shown in Table 9-6, and in Figure 9-14.

Navigation. In the early 1900's the Black Warrior River was made navigable to the Birmingham area by a series of locks and dams constructed by the Corps of Engineers.

As discussed earlier in the transportation section of the report, there are several improvements for navigation in the sub-region that are planned or under construction. Most of these improvements are expected to be completed and in operation approximately within the next decade. The Alabama River Waterway consisting of three locks and dams, two with power plants, and channel improvement will be opened for navigation to Montgomery in the early 1970's. The authorized extension of this waterway via the Coosa River to Rome, Georgia was re-analysed from the standpoint of project feasibility for this report and details of the potential waterway commerce and benefits and cost estimates are provided in Chapter 9 of Part III. The new lock at John Hollis Bankhead Dam and the Tennessee-Tombigbee Waterway, which are in the advance planning stage, will require about four and ten years, respectively, for completion when construction is initiated. Five pools and reservoirs, which will be formed by locks and dams included in the Tennessee-Tombigbee Waterway project, will furnish recreational opportunities in the Mississippi area, particularly in the eastern tier of counties containing the Columbus, Aberdeen-Amory, Tupelo and Corinth growth centers. Based on an optomistic schedule considering the presently available funds, the Tennessee-Tombigbee Waterway is expected to be essentially complete, at least all major reservoirs in place, by 1980, and effects of the project on the economy of the area should be noticeable. Pertinent data for the above water projects are given in Table 9-5; their locations are shown in Figure 9-14.

Tennessee Valley Authority

Blue Ridge, Nottely and Chatuge Dams (the latter located partially outside the sub-region in North Carolina) in the northeastern Georgia area form part of the Tennessee Valley system of water resources development operated by the Tennessee Valley Authority. These reservoir projects include storage authorized for flood control, hydroelectric power and navigation, and which also is used for recreation and fish and wildlife. The flood control and navigation storage is for areas downstream in Sub-region J.

Upper Bear Creek Reservoir, in the Tennessee River portion of the sub-region is part of a system-wide plan of improvement of the Bear Creek watershed now under construction by the Tennessee Valley Authority. The project, consisting of four dams and reservoirs and 80 miles of channel improvements, will provide flood control in areas extending into northeast Mississippi, and storage for recreation, fish and wildlife, water quality control and water supply. No storage for flood control will be reserved in the Upper Bear Creek Reservoir. Pertinent data for the Tennessee Valley Authority reservoirs are given in Table 9-4 and shown on Figure 9-14, Page II-9-47.

TABLE 9-4
SUMMARY OF PERTINENT DATA
MAJOR RESERVOIRS, WATER SUB-REGION E

ITEM	CORPS OF ENGINEERS						
	Allatoona Reservoir	Lake Sidney Lanier	Hartwell Reservoir	West Point Reservoir	John H. Bankhead Reservoir	Holt Reservoir */	Carters Reservoir
LOCATION:							
Stream	Etowah River	Chattahoochee River	Savannah River	Chattahoochee River	Black Warrior River	Black Warrior River	Coosawatee River
River Mile	48	348.5	305	201.4	153.6	135.2	27
County	Bartow	Forsyth	Anderson	Chambers, Troop	Tuscaloosa	Tuscaloosa	Murray
State	Georgia	Georgia	Georgia & S.Carolina	Alabama & Georgia	Alabama	Alabama	Georgia
STATUS:	Operating	Operating	Operating	Under Construction	Operating	Operating	Under Construction
Authorized Purposes	FC, LF, P	FC, LF, P	FC, LF, P	FC, P, R, F&W, LF	N */	N */	FC, P
Completion Date:	Oct, 1955	Jun, 1957	Feb, 1961	1973	1915	1966	Oct, 1973
DRAINAGE AREA ABOVE (Sq. Miles):	1,110	1,040	2,088	3,440	3,990	4,230	376
ELEVATION (Ft. msl.):							
Top of Upper Pool (FC/Pow)	860	1,085	665	641	255	187	1,099
Top of Summer Pool	840	1,070	660	635	255	187	1,072
Top of Dead Storage Pool	800	1,035	625	620	252	186	1,022
STORAGE ALLOCATED TO (Ac. ft.):							
Flood Control	303,000	637,000	295,500	170,271	--	--	95,700
Power	205,000	1,049,000	1,427,600	306,131	27,000	3,300	134,900
Water Quality							
Water Supply							
SEDIMENT SILT RESERVE:							
TOTAL:	671,000	2,554,000	2,842,700	774,798	296,200	118,000	472,800
SURFACE AREA (Acres):							
Top of Upper Pool (FC/Pow)	19,200	47,180	61,350	30,993	9,250	3,300	3,880
Top of Summer Pool	11,686	38,000	55,950	25,900	9,050	3,280	3,290
Top of Dead Storage	3,250	22,440	56,000	15,500	8,730	3,250	1,750
POWER INSTALLATION (Hydro):							
Capacity (1000 KW)	74	86	330	73.375	45.125	40	500
Number of Units	3	3	5	3	1	1	4
YIELD (MGD):							
Water Supply	40	8					

*/ Hydropower installed by Alabama Power Company.

TABLE [illegible] (Cont'd)
SUMMARY OF PERTINENT DATA
MAJOR RESERVOIRS, MAJOR SUB-REGION [illegible]

ITEM	Gainesville Reservoir	Aliceville Reservoir	Columbus Reservoir	Aberdeen Reservoir	Bay Springs Reservoir
	CORPS OF ENGINEERS				
LOCATION:					
Stream	Tombigbee River	Tombigbee River	Tombigbee River	Tombigbee River	Tombigbee River (Mackeys Creek)
River Mile*/	265.95	311.28	342.21	375.24	431.84
County	Green & Sumter	Pickens	Lowndes	Monroe	Tishomingo
State	Alabama	Alabama	Mississippi	Mississippi	Mississippi
STATUS:	Advance Planning	Authorized	Authorized	Authorized	Authorized
Authorized Purpose	N, R, FWL	N, R, FWL	N, R, FWL	N, R, FWL	N, R, FWL
Completion Date	By 1980	By 1980	By 1980	By 1980	By 1980
DRAINAGE AREA ABOVE (Sq. Miles):	7,142	5,785	4,470	2,055	67
ELEVATION (Ft. msl):					
Top of Upper Pool	109.0	136.0	163.0	190.0	414.0
Top of Summer Pool					
Top of Dead Storage Pool					
STORAGE ALLOCATED TO (Ac.Ft.):					
Flood Control					
Power					
Water Quality					
Water Supply					
SEDIMENT SILT RESERVE: TOTAL	———	———	———	———	———
SURFACE AREA (Acres):					
Top of Upper Pool (FC/Pow)	7,200	9,500	7,700	5,000	6,800
Top of Summer Pool					
Top of Dead Storage Pool					
POWER INSTALLATION (Hydro):					
Capacity (1,000 kw)					
Number of Units					
YIELD (MGD):					
Water Supply					

*/ Navigation mileages, measured above mouth of Mobile River.

TABLE 9-4 (Cont'd)
SUMMARY OF PERTINENT DATA
MAJOR RESERVOIRS, WATER SUB-REGION E

ITEM	CORPS OF ENGINEERS							
	TENNESSEE VALLEY AUTHORITY				DEPARTMENT OF THE INTERIOR	CITY OF TUSCALOOSA	CITY OF BIRMINGHAM	
	Blue Ridge Lake	Nottely Lake	Chatauge Lake	Upper Bear Creek Reservoir	Bluff Lake	North River Reservoir	Lake Purdy	Inland Lake
LOCATION:								
Stream	Toccoa River	Nottely River	Hiwassee River	Bear Creek	Octoc Creek Noxubee River	North River	Little Cahaba R.	Blackburn Fork
River Mile	53	21	121	115	6.5	1.5	5	12.2
County	Fannin	Union	Clay	Marion	Noxubee, Oktibbeha	Tuscaloosa	Shelby	Blount
State	Georgia	Georgia	N.Carolina	Alabama	Mississippi	Alabama	Alabama	Alabama
STATUS:	Operating	Operating	Operating	Under Construction	Operating	Under Construction	Operating	Operating
Authorized Purposes	P	FC, P, N	FC, P, N	R, F&W, LF	F&W			
Completion Date	Jul, 1931	Jan, 1956	Dec, 1954		Apr, 1938	Jun, 1969	1909	1939
DRAINAGE AREA ABOVE (Sq. Miles):	232	214	189	113	38	418	196	72
ELEVATION (Ft. msl.):								
Top of Upper Pool (FC/Pow)	1,690.8	1,780	1,928	797	223.6	223.2	550	784
Top of Summer Pool	1,680	1,758	1,918	797	220.9	223.2	550	784
Top of Dead Storage	1,589.8	1,690	1,860	787	215.0	181.1	490	729
STORAGE ALLOCATED TO (Ac. ft.):								
Flood Control		*/	**/	--	--	--	--	--
Power	184,000	161,600	222,100	--	--	--	--	--
Water Quality						123,100	17,400	64,400
Water Supply								
SEDIMENT SILT RESERVE:								
TOTAL:	196,500	174,300	240,500	37,400	4,800	177,000	17,400	64,400
SURFACE AREA (Acres):								
Top of Upper Pool (FC/Pow)	3,330	4,310	7,290	1,850	1,200	5,885	1,050	1,572
Top of Summer Pool	2,950	2,450	5,400	1,850	1,200	5,885	1,050	1,572
Top of Dead Storage	630	560	990	1,250	1,200	1,840	20	12
POWER INSTALLATION (Hydro):								
Capacity (1000 KW)	20	15	10	--	--	--	--	--
Number of Units	1	1	1	--	--	--	--	--
YIELD (MGD):								
Water Supply							54.5 Dep.	50 Dep.

*/ Includes flood control storage of up to 110,000 acre feet.

**/ Includes flood control storage of up to 105,000 acre feet.

TABLE 9-[illegible] (Cont'd)
SUMMARY OF PERTINENT DATA
MAJOR RESERVOIRS, WATER SUB-REGION F

ITEM	Thurlow Reservoir	Yates Reservoir	Martin Lake	Walter Bouldin Lake*/	Jordan Lake*/	Mitchell Lake	Lay Lake	Logan Martin Reservoir
	ALABAMA POWER COMPANY							
LOCATION:								
Stream	Tallapoosa River	Tallapoosa River	Tallapoosa River	Coosa River	Coosa River	Coosa River	Coosa River	Coosa River
River Mile	49.7	52.7	60.6	8.9	18.9	37.3	51.3	99.5
County	Elmore, Tallapoosa	Elmore, Tallapoosa	Elmore, Tallapoosa	Elmore	Elmore	Chilton, Coosa	Chilton, Coosa	St.Clair, Talladega
State	Alabama	Alabama	Alabama	Alabama	Alabama	Alabama	Alabama	Alabama
STATUS:	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Authorized Purposes								
Completion Date	1931	1928	1927	1967	1929	1923	1914	1964
DRAINAGE AREA ABOVE (Sq. Miles):	3,300	3,250	3,000		10,165	9,827	9,087	7,770
ELEVATION (Ft. msl.):								
Top of Upper Pool (FC/Pow)	288.3	344	490		252	317	396	477
Top of Summer Pool	288.8	344	490		252	311.9	396	465.0
Top of Dead Storage Pool	283.5	340	480		235	306	382	460
STORAGE ALLOCATED TO (Ac. ft.):								
Flood Control	--	--	--		--	--	--	245,300
Power	--	8,900	1,375,000		55,000	33,000	121,000	67,600
Water Quality								
Water Supply								
SEDIMENT SILT RESERVE:								
TOTAL:	18,400	54,000	1,630,000		233,500	177,000	241,500	518,600
SURFACE AREA (Acres):								
Top of Upper Pool (FC/Pow)	574	2,000	39,200		6,628	5,850	11,800	26,310
Top of Summer Pool	5,800	19,900	39,184		6,628	5,850	11,790	15,260
Top of Dead Storage Pool	505	1,840	33,300		4,268	5,250	5,752	11,890
POWER INSTALLATION (Hydro):								
Capacity (1000 KW)	58	32	154.2	225	100	72.5	177	128.25
Number of Units	3	2	4	3	4	4	6	3
YIELD (MGD):								
Water Supply								

*/ Walter Bouldin Lake is a common impoundment with Jordan Lake. The Walter Bouldin power house operates from a sub-impoundment of Jordan Lake.

TABLE 9-[illegible] (Cont'd)

SUMMARY OF PERTINENT DATA

MAJOR RESERVOIRS, WATER SUB-REGION E

ITEM	ALABAMA POWER CO. (CONT'D.)			GEORGIA POWER COMPANY					
	H.Neely Henry Reser-voir	Weiss Reservoir	Lewis M. Smith Lake	Burton Lake	Nacoochee Lake	Lake Rabun	Tallulah Falls Reservoir	Tugalo Lake	Yonah Lake
LOCATION:									
Stream	Coosa River	Coosa River	Sipsey Fk. Black Warrior	Tallulah River	Tallulah River	Tallulah River	Tallulah River Tiger Crk.	Tallulah River	Tugalo River
River Mile	148.0	225.7	14	23	19	4.7	1.8	46	43
County	St.Clair, Talladega	Cherokee	Walker, Cullman	Rabun	Rabun	Rabun	Rabun, Habersham	Habersham, Oconee	Stephens, Oconee
State	Alabama	Alabama	Alabama	Georgia	Georgia	Georgia	Georgia	Georgia & S.Carolina	Georgia & S.Carolina
STATUS:	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating	Operating
Authorized Purposes									
Completion Date	Jun, 1966	Jul, 1962	Jul, 1962	1927	1926	1925	1913	1923	1925
DRAINAGE AREA ABOVE (Sq. Miles):	6,600	5,273	944	118	136	151	186	464	470
ELEVATION (Ft. msl.):									
Top of Upper Pool (FC/Pow)	508	574	522	1866.6	1752.5	1689.6	1500	891.5	744.2
Top of Summer Pool	508	564.0	510	1866.6	1752.5	1689.6	1500	891.5	744.2
Top of Dead Storage Pool	505	558	488	1818	1752.5	1689.6	1500	891.5	744.2
STORAGE ALLOCATED TO (Ac. ft.):									
Flood Control	--	397,000	280,600	--	--	--	--	--	--
Power	30,600	148,400	394,300	108,000	2,500	31,000	2,400	11,000	3,500
Water Quality									
Water Supply									
SEDIMENT SILT RESERVE:									
TOTAL:	121,900	703,400	1,670,600	108,000	2,500	31,000	2,400	11,000	3,500
SURFACE AREA (Acres):									
Top of Upper Pool (FC/Pow)	11,200	50,000	25,700	2,775	240	834	63	597	325
Top of Summer Pool	11,235	30,200	21,200	2,775	240	834	63	597	325
Top of Dead Storage Pool	9,080	19,500	15,100	1,000	240	834	63	597	325
POWER INSTALLATION (Hydro):									
Capacity (1000 KW)	72.9	87.75	157.5	6.12	4.8	16	72	45	22.5
Number of Units	3	3	2	2	2	2	6	4	3
YIELD (MGD):									
Water Supply			60						

TABLE 9-5

SUMMARY OF PERTINENT DATA
NAVIGATION PROJECTS, SUB-REGION E

	Alabama River, Alabama*/	Black Warrior-Tombigbee Rivers, Alabama	Waterway Connecting Tombigbee and Tennessee Rivers, Alabama and Mississippi****/
LENGTH OF WATERWAY:			
Total Above Mobile (Mi.)	359	453	470
Length in Appalachia (Mi.), (Sub-region E)	26	158	185
CHANNEL DIMENSIONS (Ft.)	9 x 200	9 x 200	*****/
LIFT:			
Waterway Total (Ft.)	120	258	341******/
Lift in Appalachia (Ft.), (Sub-region E)	0	160	305
LOCKS:			
Total Number	3	6	10******/
Number in Appalachia, (Sub-region E)	0	3	9
Chamber Dimensions (Ft.)	84 x 600	**/	110 x 600
Minimum Depth Over Sills (Ft.)	13	9.6***/	15

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*/ Project under construction.

**/ In Appalachia: One 95' x 460', 1-110' x 600', and 1-52' x 285' double-lift which will be replaced by a 110' x 600' single-lift. Others on waterway, 110' x 600'.

***/ Minimum will be 12.9' (Oliver Lock and Dam) when Bankhead Lock is replaced.

****/ Authorized but not constructed.

*****/ Lower 100 miles, 9' x 300'; upper 85 miles, 12' x 300' (280' wide in actual divide cut).

******/ Demopolis to Pickwick Pool.

TABLE 9-6

SUMMARY OF PERTINENT DATA
LOCAL PROTECTION PROJECTS, SUB-REGION E

PART I - CHANNEL RECTIFICATION

	TOMBIGBEE RIVER BASIN										
LOCATION (City or Counties):	Itawamba & Prentiss Counties, Miss.	Itawamba Co., Miss.	Lee & Itawamba Counties, Miss.	Itawamba Co., Miss.	Lee & Monroe Counties Miss.	Monroe Co., Miss.	Monroe Co., Miss.	Lowndes Co., Miss., Lamar Co., Ala., Columbus, Miss.	Lowndes & Clay Counties, Miss.	Prentiss & Itawamba Counties, Miss.	Monroe Co., Miss.
STREAM:	Big Brown Creek	Donivan Creek	Twenty Mile Cr.	Mantachie Creek	West Fork Tombigbee R.	James Cr.	Stanefer Creek	Luxapalila Creek	Tibbee River	Little Browns Cr.	West Fork Tombigbee R.
TYPE:	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture & Urban	Agriculture	Agriculture	Agriculture
DRAINAGE AREA AT SITE (Sq. Mi.):	162	44	174	65	667	44	20	802	1,121	64	667
TOTAL LENGTH OF STREAM (Miles):	21	18	29.7	21	28.4	12	11	75	24.3		28
LENGTH OF IMPROVED CHANNEL (Ft.):	18,400	21,500	61,700	26,400	96,624	47,500	18,850	105,000	125,860	40,100	5,300
KIND OF IMPROVEMENT											
Clearing and Snagging (Ft.):	-	-	13,700	14,600	79,200	47,500	1,000	-	44,110	-	-
Channel Excavation (Ft.):	18,400	21,500	48,000	11,800	17,424	-	17,850	105,000	81,750	40,100	5,300
BOTTOM WIDTH OF IMPROVED CHANNEL (Ft.):	40	24	50-40-15	25	50-150	-	20-35	70-150	75	25-32	90
IMPROVED CHANNEL CAPACITY (cfs)	4,500	2,200	3200-3700	2,500	3000-7000	1,200	860	5500-21,700	13,600	2,100	11,800
COMPLETION DATE:	1965	1966	1966	1968	1950	1969	1969	By 1980	By 1980	By 1980	By 1980

	TOMBIGBEE RIVER BASIN (cont'd)											
LOCATION (City or Counties):	Monroe & Lowndes Counties, Miss. Lamar Co., Ala.	Clay & Lowndes Counties, Miss.	Clay & Chickasaw Counties, Miss.	Clay & Chickasaw Counties, Miss.	Clay & Oktibbeha Counties, Miss.	Clay Co., Miss.	Clay Co., Miss.	Clay Co., Miss.	Oktibbeha Co., Miss.	Clay & Oktibbeha Counties, Miss.	Noxubee Co., Miss., & Sumter Co., Ala.	Greene, Pickens Tuscaloosa & Fayette Counties, Ala.
STREAM:	Buttahatchie R.	Catalpa Creek	Sakatonchee Cr.	Houlka Creek	Line Cr.	North Canal	South Canal	Johnson Creek	Trim Cane Creek	Sun Creek	Noxubee R.	Sipsey R.
TYPE:	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture
DRAINAGE AREA AT SITE (Sq.Mi.):	862	116	523	234	382			23	174	59	1,400	786
TOTAL LENGTH OF STREAM (Miles):	120		50		25						135	170
LENGTH OF IMPROVED CHANNEL (Ft.):	309,900	44,900	166,300	118,800	65,000	30,600	26,400	16,900	29,600	28,000	537,500	615,100
KIND OF IMPROVEMENT												
Clearing and Snagging (Ft.):	-	7,900	-	-	-	-	-	-	-	-	531,700	169,000
Channel Excavation (Ft.):	309,900	37,000	166,300	118,800	65,000	30,600	26,400	16,900	29,600	28,000	5,800	446,100
BOTTOM WIDTH OF IMPROVED CHANNEL (Ft.):	36-50	24	15-70	28-80	30-60	15-40	Cut to grade	10	20	16	30	55
IMPROVED CHANNEL CAPACITY (cfs)	3000-6400	2,000	2200-5200	2300-4700	3,500	2,700	1,000	1,100	2,000	1,500	4200-8200	4000-5800
COMPLETION DATE:	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980	By 1980

TABLE 9-6 (Cont'd)
SUMMARY OF PERTINENT DATA
LOCAL PROTECTION PROJECTS, SUB-REGION E
PART I - CHANNEL RECTIFICATION (Cont'd)

	ALABAMA-COOSA RIVER BASIN					
LOCATION (City or Counties):	Floyd & Chattoga Counties, Georgia	Glenco, Alabama	Gadsden, Alabama	Trussville, Alabama	Clanton, Alabama	Bibb, Perry, Dallas Counties, Alabama
STREAM:	Armuchee Creek	Little Cove Creek	Black Creek	Cahaba River & Pinchgut Creek	Poley Bridge, Goose Pond & Walnut Creeks	Cahaba River
TYPE:	Agriculture	Urban	Urban	Urban	Urban	Agriculture
DRAINAGE AREA SITE (Sq. Miles):	225	7.6	62	26.8	30	1,378
TOTAL LENGTH OF STREAM (Miles):	40	7.0	20	18.2	13.5	189.1
LENGTH OF IMPROVED CHANNEL (Ft.):	83,000	11,500	24,150	15,080	33,500	152,275*/
KIND OF IMPROVEMENT						
Clearing & Snagging (Ft.):	83,000	-	12,600	-	-	152,275
Channel Excavation (Ft.):	-	11,500	11,550	15,080	33,500	-
BOTTOM WIDTH OF IMPROVED CHANNEL (Ft.):	-	25	50-62	40-50	30-60	-
IMPROVED CHANNEL CAPACITY (cfs):	10,000	2,000	5,000	1,600-1,700	1,300-1,800	-
YEAR COMPLETED	1965	1963	1952	1964	1963	1939 & 1940

*/ In addition, 13.3 miles of channel had the underbrush removed along the banks in 1939 and 12 miles of the channel were resnagged in 1940.

PART II - LEVEE SYSTEMS

	ROME, GEORGIA	COLLINSVILLE, ALABAMA		
STREAM:	Coosa & Oostanaula Rivers	No. Branch, So. Branch Little Wills Creek	Small Spring Branch	Main Branch
COUNTY:	FLOYD	DEKALB		
DRAINAGE AREA (Sq. Miles)	3,960	10.6		
LEVEES:				
Length (Feet)	9,010	2,020		
Top Width (Feet)	10-7,260 l.f. 18-1,750 l.f.	10		
Average Height (Feet)	18	4-7		
SLOPE:				
Landside	1 on 3	1 on [illegible].5		
Riverside	1 on 3, and 1 on 2½	1 on 2.0		
CONCRETE FLOOD WALLS:				
Length (Feet)	546	240		
Average Height (Feet)	23	13		
PUMPING STATIONS - NUMBER	2	1		
Number of Pumps	4	1		
Total Capacity (gpm)	20,400	6,000		
CHANNEL EXCAVATION (Feet)	9,000*/	6,754		
YEAR COMPLETED	1938	1939		

*/ Because the borrow material for the levees was taken from riverside borrow pits, the existing river channel was increased in widths ranging from 40 to 200 feet.

U.S. Department of Agriculture

Completed Watershed Projects. As of June 30, 1967, twelve upstream watershed projects have been completely installed. These watersheds comprise an area of 688.5 square miles. A total of 69 retarding and multi-purpose reservoirs controlling 168.6 square miles and 143.1 miles of channel improvement have been installed. The reservoirs contain 4,100 acre-feet of storage for sediment, 36,000 acre-feet for flood prevention, 1,700 acre-feet for municipal and industrial water supply and 270 acre-feet for recreation. Average annual flood water damages before projects were installed totaled an estimated 266,600 dollars. The average annual benefits from the installation of the projects are estimated to be 382,200 dollars. Watershed development is portrayed in Figure 9-14, Page II-9-47, and pertinent data is shown in Table 9-7.

Approved Watershed Projects. An additional 59 upstream watershed projects have been approved (as of June 30, 1967) and are being installed. These watersheds comprise an area of 7,484.2 square miles. A total of 557 retarding and multi-purpose reservoirs with a drainage area of 2,672.1 square miles and 1,590.8 miles of channel improvement have been or will be installed. The reservoirs contain 101,955 acre-feet of storage for sediment, 596,426 acre-feet for flood prevention, 19,313 acre-feet for municipal and industrial water supply, 21,720 acre-feet for recreation and 1,326 acre-feet for fish and wildlife.

The estimated installation cost for the structural measures in the 59 approved watersheds total about $88.2 million with an additional $42.1 million for land treatment measures. Total average annual flood water damages in the watersheds prior to project construction are estimated at 5,920,600 dollars. Theaaverage annual benefits from the installation of the projects are estimated to be 7,144,400 dollars. Pertinent data for the watershed projects are shown in Table 9-7.

Land Use Programs. The land use, treatment, and management program of the various U.S. Department of Agriculture agencies are contributing significantly to improve water quality of the sub-region by reduction of erosion and sediment. Basic conservation plans are being put into effect for about 7,493,932 acres by over 57,725 landowners and operators cooperating with their local soil and water conservation districts. To date, 6,218,967 acres, or 25 percent of land in the sub-region, have been adequately treated through the application and installation of conservation practices needed to meet its planned use, improvement, and protection. State and Federal forest fire prevention and suppression programs cover the entire sub-region. Appendix A discusses the U.S. Department of Agriculture programs in detail.

Other Water Resources Programs. The U.S. Department of Agriculture's Farmers Home Administration has received applications for water and sewer comprehensive planning grants from 61 counties totaling about

464,230 dollars. In addition, applications have been received for loans and grants for improving, enlarging, or constructing sewer systems, waste treatment plants, or storm drains from 34 communities, associations, public service districts, and towns. Total estimated costs exceed 11,654,810 dollars.

TABLE 9-7

SUMMARY OF PERTINENT DATA
UPSTREAM WATERSHED PROJECTS, SUB-REGION E*/

Map Reference Number (Figure 9-14)	Name of Watershed	Status	Drainage Area of Watershed (Sq. mi.)	Drainage Area Regulated (Sq. mi.)	Number of Structures: Flood Retention	Number of Structures: Multi-purpose	Storage Volume by Purpose (Acre Feet): Flood Water	Recreation	M&I Water Supply	Other**/
	SAVANNAH RIVER BASIN									
13	Grove River, Ga.	Authorized	86.88	57.70	10	1	14,061		948	2,626
22	Middle Fork Broad R., Ga.	Authorized	79.42	42.69	10		7,388			1,305
6	N. Fork Broad R., Ga.	Completed	63.43	23.60	12		5,152			647
28	North Broad R., Ga.	Authorized	72.61	19.60	8		4,209			663
15	Head of Little Tennessee River, Ga.	Authorized	57.33	21.53	2		2,660			161
16	Hiawassee River, Ga.	Authorized	58.88	29.72	1	1	4,948	141		928
4	Hightower Creek, Ga.	Completed	35.86	6.29	4		740			102
46	Hudson River, Ga. ***/	Authorized	107.37	197.96	16	1	26,647			66
	ALTAMAHA-OCONEE RIVER BASIN									
14	Haynes Creek-Brushy Fork, Ga.	Authorized	31.25	6.70	4		1,462			221
	APPALACHICOLA-CHATTAHOOCHEE RIVER BASIN									
3	Hazel Creek, Ga.	Completed	30.56	8.08	3	1	1,611		150	179
7	Sautee Creek, Ga.	Completed	31.25	11.00	4	1	2,324	270		383
55	Suwanee River, Ga. ***/	Authorized	52.54	16.59	3		4,384			
56	Tesnatee River, Ga. ***/	Authorized	70.62	23.59	5	2	7,332	475	49	
	ALABAMA-COOSA RIVER BASIN									
1	Amicalola Creek, Ga.	Completed	125.46	15.95	4		3,123			286
8	Settingdown Creek, Ga.	Completed	53.23	29.30	15		6,349			416
9	Allatoona Creek, Ga.	Authorized	101.59							
10	Cartecay River, Ga.	Authorized	140.23	50.07	7		7,844			812
11	Ellijay River, Ga.	Authorized	95.47	44.87	8		7,804			772
12	Etowah River Reach, Ga.	Authorized	201.03	87.32	18		19,771			2,701
17	Little River, Ga.	Authorized	105.38	37.04	14		6,846			1,030
18	Little Tallapoosa R., Ga.	Authorized	97.68	62.25	11	3	14,805		2,471	1,591
19	Long Swamp Creek, Ga.	Authorized	89.02	43.57	6		9,242			750
20	Lower Little Tallapoosa River, Ga.	Authorized	208.55	128.30	20	7	36,183	303	3,673	6,330
24	Mill Creek, Ga.	Completed	50.94	23.43	4	2	4,298		1,048	396
25	Mill-Canton Creek, Ga.	Authorized	130.29	22.44	8		4,741			722
26	Mountaintown Creek, Ga.	Authorized	87.90	25.33	4		4,877			438
27	Noonday Creek, Ga.	Authorized	50.40	22.28	13		5,002			789

*/ Includes only those projects that have been completed or authorized for installation, as of June 30, 1967.

**/ Includes Sediment, Irrigation and Fish and Wildlife.

***/ Authorized after June 30, 1967.

TABLE 9-7 (cont'd)

SUMMARY OF PERTINENT DATA
UPSTREAM WATERSHED PROJECTS, SUB-REGION E

Map Reference Number (Figure 9-14)	Name of Watershed	Status	Drainage Area of Watershed (Sq. mi.)	Drainage Area Regulated (Sq. mi.)	Number of Structures: Flood Retention	Number of Structures: Multi-purpose	Storage Volume by Purpose (Acre Feet): Flood Water	Recreation	M&I Water Supply	Other**/
	ALABAMA-COOSA (Cont'd)									
29	Pumpkinvine Cr., Ga.	Authorized	162.18	73.87	18		17,799			2,012
30	Raccoon Cr., Ga.	Authorized	61.67	44.60	5		10,212			980
32	Sharp Mountain Cr., Ga.	Authorized	92.86	38.90	14		8,845			1,118
36	Talking Rock Cr., Ga.	Authorized	188.90	25.72	6		6,606			629
40	Big Cedar Cr., Ga.	Authorized	208.13	42.00	10	1	12,232	933		1,884
43	Euharlee Cr., Ga.	Authorized	170.19	51.19	11	1	13,235	566		1,923
35	Stamp-Shoal Cr., Ga.	Authorized	152.97	14.76	2		3,078			376
48	Little River, Ga.	Authorized	44.50	24.32	5	1	7,116		120	1,329
53	Pine Log Tributary, Ga.	Authorized	131.09	81.32	15	1	21,611	360		2,529
54	Sallacoa Creek Area, Ga.	Authorized	119.69	67.37	16	2	17,116	425	309	2,315
5	Jacks River, Ga.	Completed	123.84		(No Treatment Needed)					
6	Blue Eye Cr., Ala.	Authorized	22.08	7.97	2		2,017			168
7	Cheaha, Ala.	Authorized	121.88	50.31	5		10,085			462
8	Choccolocco Cr., Ala.	Authorized	375.94	116.95	12	3	34,005	326	9,792	2,183
9	Crooked Cr., Ala.	Authorized	99.31	29.96	4	2	6,435		2,000	629
11	High Pine Cr., Ala.	Completed	80.61	27.40	8	1	6,267		500	836
14	Lost Creek, Ala.	Authorized	26.78	13.62	4		2,828			444
15	Mill Cr., Ala.	Authorized	10.61	7.31	1		3,497			631
16	Terrapin Cr., Ala.	Authorized	286.99	121.60	10		22,198			1,663
13	Ketchepedrake Cr., Ala.	Authorized	54.86	29.10	5		7,139			233
20	Cahulga Cr., Ala. ***/	Authorized	18.96	6.54		1	2,399		637	
	TOMBIGBEE-WARRIOR RIVER BASIN									
3	Little New River, Ala.	Completed	50.79	12.03	3		3,020			329
1	Shammack Cr., Miss.	Completed	16.52	5.89	5		1,855			360
11	Houlka Cr., Miss.	Authorized	229.00	62.28	14	2	20,131	1,975		2,425
4	Chuquatonchee, Miss.	Authorized	213.80	86.35	21	1	26,485			3,397
19	Old Town Cr., Miss.	Authorized	385.90	158.56	28	7	52,555	15,394		5,602
3	Chiwapa Cr., Miss.	Authorized	158.33	33.07	9	1	9,517	469		877
	OTHER MISSISSIPPI STREAMS									
1	Bristows Cr., Ala.	Completed	25.93	5.60		2	1,125			733
2	Cane Cr., Miss.	Authorized	26.56	5.27	6		1,367			250
5	Coldwater River, Miss.	Authorized	277.38	63.49	13		17,016			4,029
6	Cypress & Puss Cuss Cr.,Miss.	Authorized	87.79	35.20	11		8,088			876
7	Duncan-Cane Cr., Miss.	Authorized	30.81	7.89	6		2,033			265
8	Fair Cr., Miss.	Authorized	5.84	1.94	2		588			231
9	Grays Cr., Miss.	Authorized	36.90	13.31	10		4,045			455
12	L. Spring-Ochowalla Cr.,Miss.	Authorized	50.44							
13	Locks Cr., Miss.	Authorized	32.80	9.88	4		2,367			399
14	Lower Tippah R., Miss.	Authorized	164.39	95.54	11	1	23,633	828		19,938
15	Mill Cr., Miss.	Authorized	31.78	4.51	4		878			326
16	Muddy Cr., Miss.	Authorized	126.24	49.11	28		13,888			2,688
17	North Tippah Cr., Miss.	Authorized	26.56	3.93	4		806			172
18	Oaklimeter Cr., Miss.	Authorized	98.80	11.63	12		2,929			351
20	Pigeon Roost Cr., Miss.	Authorized	236.20	2.88	3		572			180
21	Tallahago Cr., Miss.	Authorized	124.00	43.76	11		14,391			3,337
22	Tuscumbia Cr., Miss.	Authorized	348.70	98.41	22		29,310			11,391
23	Upper Skuna R., Miss.	Authorized	156.84							
24	Upper Tippah R., Miss.	Authorized	98.60	2.01	1		507			44
25	West Hatchie Cr., Miss.	Authorized	74.80	25.38	8		6,144			989
10	Hell Cr., Miss.	Authorized	40.36	5.68	5		1,279			386
26	Brown Cr., Miss. ***/	Authorized	147.34	65.10	8		22,065			22,065
SUMMARY -	12 completed				62	7				
	64 authorized				554	39				
TOTAL -	76				616	46				

Water Resources Development - Non-Federal

Georgia and Alabama Power Companies

Private investment constitutes the major portion by far of the non-Federal expenditures for water resources development in the sub-region. A total of 17 reservoirs (See Figure 9-14, Page II-9-47) as well as other facilities have been constructed by the Georgia and Alabama Power Companies, primarily for hydroelectric power generation. The two companies have also constructed several large stream-electric generating plants in the sub-region which utilize nearby stream waters for cooling and other purposes. In developing the full power potential of the Coosa River, the Alabama Power Company has constructed its dams so that navigation locks can be added later by the Federal government when the authorized project for navigation to Rome, Georgia is constructed. Storage for flood waters is provided at some of their Coosa River projects to compensate for valley storage displaced by the reservoirs.

Municipal

Table 9-8 presents an inventory of water supply sources for cities exceeding 5,000 population in the sub-region.

TABLE 9-8
MUNICIPAL WATER FACILITIES - CITIES EXCEEDING 5,000 POPULATION

City	Est. Pop. Served	Source of Supply	Rated Plant Cap. MGD	Average Plant Output MGD
		GEORGIA		
Toccoa	8,000	Little Toccoa & Little Panther Creek	4.5	3.0
Gainesville	30,000	Lake Lanier	6.0	4.7
Cartersville	14,000	Etowah River & Spring	2.0	1.7
Dalton	35,000	Mill, Coahulla Creeks, Conasauga River	20.0	12.5
Rome	50,000	Oostanaula River	12.0	6.0
Cedartown	13,000	Big Spring	1.7	1.5
Carrollton	11,000	Little Tallapoosa River	2.5	1.2
		ALABAMA		
Fort Payne	8,500	Creek	1.8	0.9

TABLE 9-8 (Cont'd)

MUNICIPAL WATER FACILITIES - CITIES EXCEEDING 5,000 POPULATION

City	Est. Pop. Served	Source of Supply	Rated Plant Cap. MGD	Average Plant Output MGD
		ALABAMA (Cont'd)		
Attalla	(8,800)	City of Gadsden	-	-
Gadsden	75,000	Coosa River	15.0	8.5
Anniston	60,000	Coldwater Spring	20.0	10.0
West End Anniston*/	N/A	N/A	N/A	N/A
Jacksonville	6,000	Spring	0.8	0.7
Roanoke	6,480	Sims & High Pine Creeks	0.9	0.4
Alexander City	14,000	Hillabee Creek	4.0	1.7
Lanett	11,200	Chattahoochee River	3.0	1.4
Cullman	14,000	Black Warrior River Branch & Bridge Creek	3.5	1.7
Jasper	20,000	Warrior River	4.3	1.4
Birmingham	600,000	Inland & Purdy Lake, Warrior & Cahaba River	77.0	60.0
Tarrant City	(7,810)	Birmingham	-	-
Bessemer	(93,000)	Birmingham	-	-
Fairfield	(14,400)	Birmingham	-	-
Homewood	(22,000)	Birmingham	-	-
Hueytown**/	N/A	N/A	N/A	N/A
Leeds	7,000	2 Springs	0.8	0.5
Mountain Brook	(12,680)	Birmingham	-	-
Talladega	17,200	Talladega Creek & Well	5.6	1.4
Sylacauga	14,000	Tallahatchee Creek & Wells	4.0	1.2
Tuscaloosa	72,000	Yellow Creek	13.0	9.0
Northport	(6,800)	Tuscaloosa	-	-
Clanton	7,600	Mitchell Lake	1.2	0.5
		MISSISSIPPI		
Corinth	11,450	5 Deep Wells	4.0	2.0
Holly Springs	5,620	3 Deep Wells	1.7	X
New Albany	5,150	3 Deep Wells	X	X
Tupelo	17,220	11 Deep Wells	X	X
Amory	6,480	6 Flowing Wells	X	X
Aberdeen	6,450	4 Deep Wells	X	X
West Point	8,550	5 Deep Wells	X	X
Columbus	24,770	Luxapallila River	5.0	3.0

TABLE 9-8 (Cont'd)

MUNICIPAL WATER FACILITIES - CITIES EXCEEDING 5,000 POPULATION

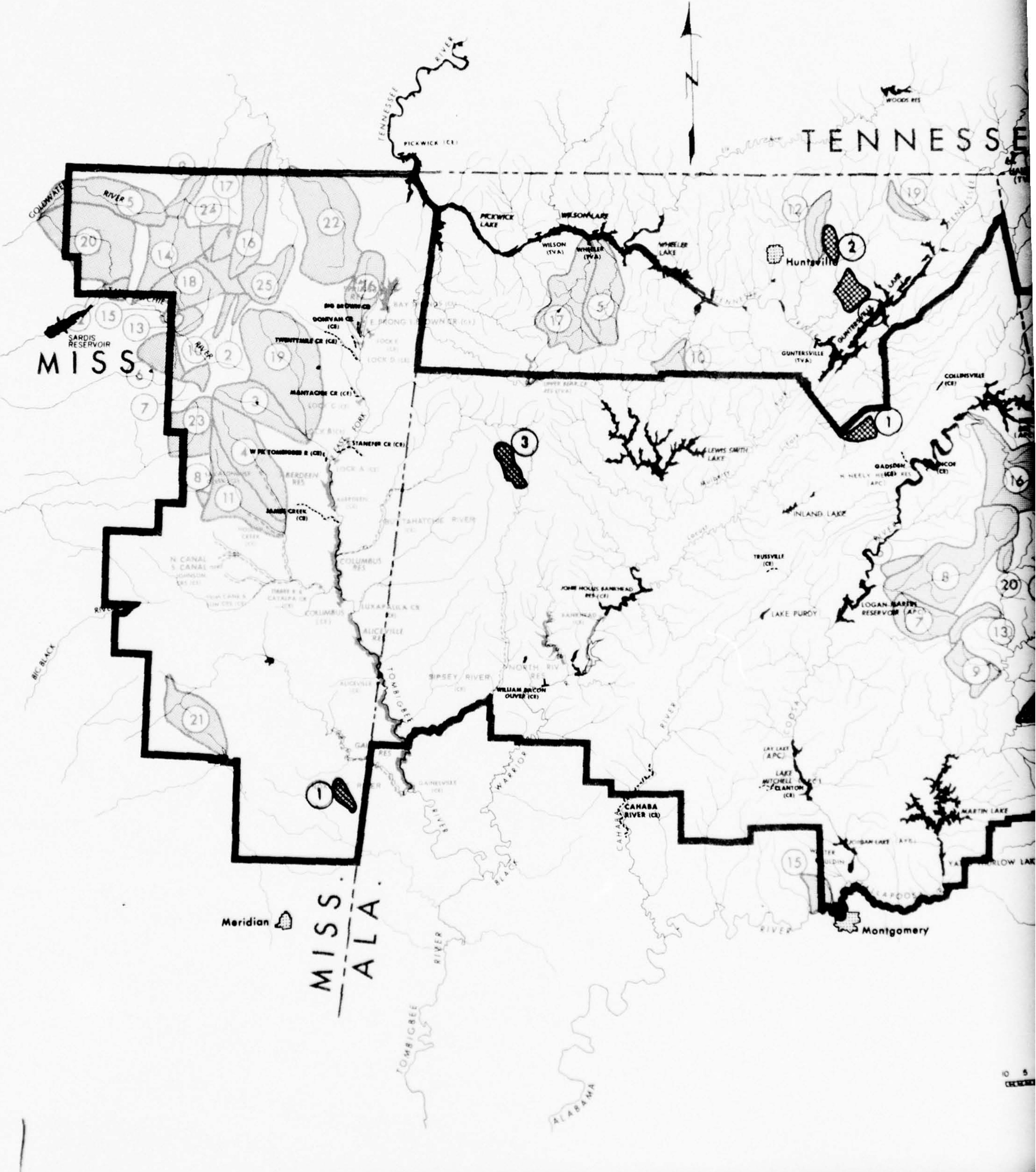
City	Est. Pop. Served	Source of Supply	Rated Plant Cap. MGD	Average Plant Output MGD
		MISSISSIPPI (Cont'd)		
Starkville	9,040	4 Deep Wells	X	X
Louisville	5,065	4 Deep Wells	2.0	X
TOTAL	1,359,265		216.3	134.9

*/ Anniston, probable source of supply.

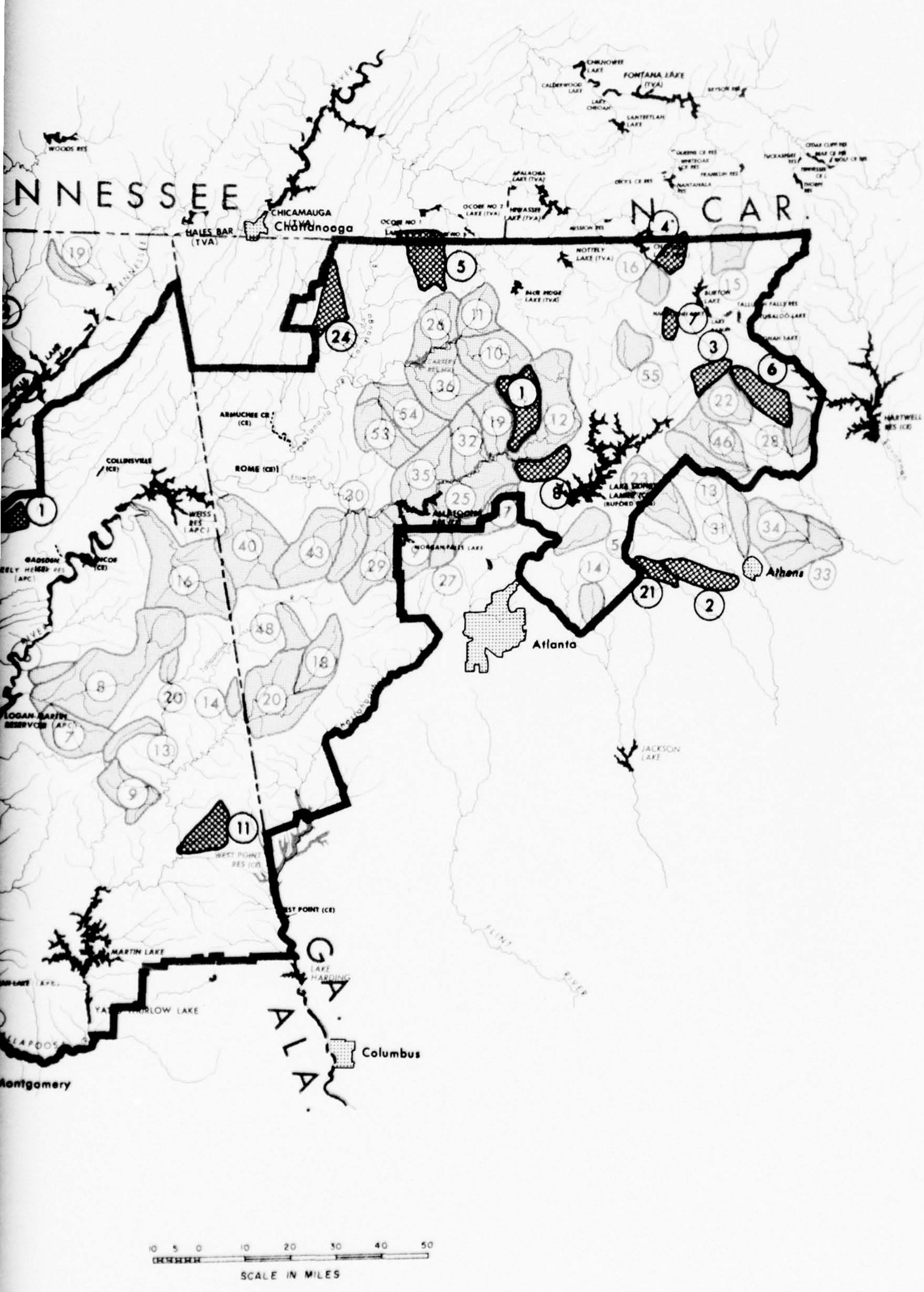
**/ Birmingham, probable source of supply.

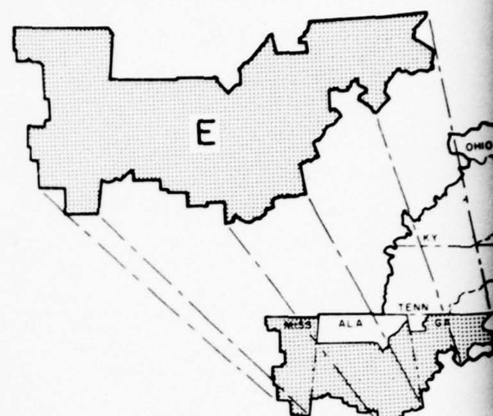
An "X" indicates the data are unknown or not supplied.
(1000) Data in parentheses indicate pop. served by other facility.
A dash "-" signifies the item does not apply.

Sub-region E is somewhat unique, when compared to other areas of Appalachia, because the investment therein by local and private interests for water resources development compares very favorably with the substantial investment made to the present time for that purpose by the Federal government. Expenditures by local governments have been largely for stream impoundments for water supply and improvements. and improvements for flood control, primarily channel rectification. Notable examples are Purdy Dam on the Little Cahaba River and Inland Dam on Blackburn Fork, a tributary of the Locust Fork of the Black Warrior River, which were constructed for municipal and industrial water supply at Birmingham. The North River Reservoir being constructed on the North River, a tributary of the Black Warrior River, by the City of Tuscaloosa primarily for municipal and industrial water supply will also afford additional recreational opportunities in that area. The location of municipal water resource development structures are included in Figure 9-14 and pertinent data are shown in Table 9-4.



TENNESSE
MISS.
MISS.
ALA.
Huntsville
Meridian
Montgomery
SARDIS RESERVOIR
PICKWICK (CE)
PICKWICK LAKE
WILSON LAKE
WHEELER LAKE
GUNTERSVILLE (TVA)
WOODS RES
LEWIS SMITH LAKE
INLAND LAKE
LAKE PURDY
TRUSSVILLE (CE)
COLLINSVILLE (CE)
LOGAN MARTIN RESERVOIR (APC)
MARTIN LAKE
CAHABA RIVER (CE)
WILLIAM BACON OLIVER (CE)
SIPSEY RIVER
COLUMBUS RES
ALICEVILLE RES
STANEFER CR (CE)
JAMES CREEK (CE)
TWENTYMILE CR (CE)
MANTACHIE CR (CE)
TOMBIGBEE
BIG BLACK
ALABAMA
RIVER





VICINIT

COMPLETED

UPSTREAM WATERSHEADS

MAJOR RESERVOIRS

CHANNEL IMPROVEMENTS

LEVEE OR WALL

LOCK(S) & DAM

DAM

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WAT

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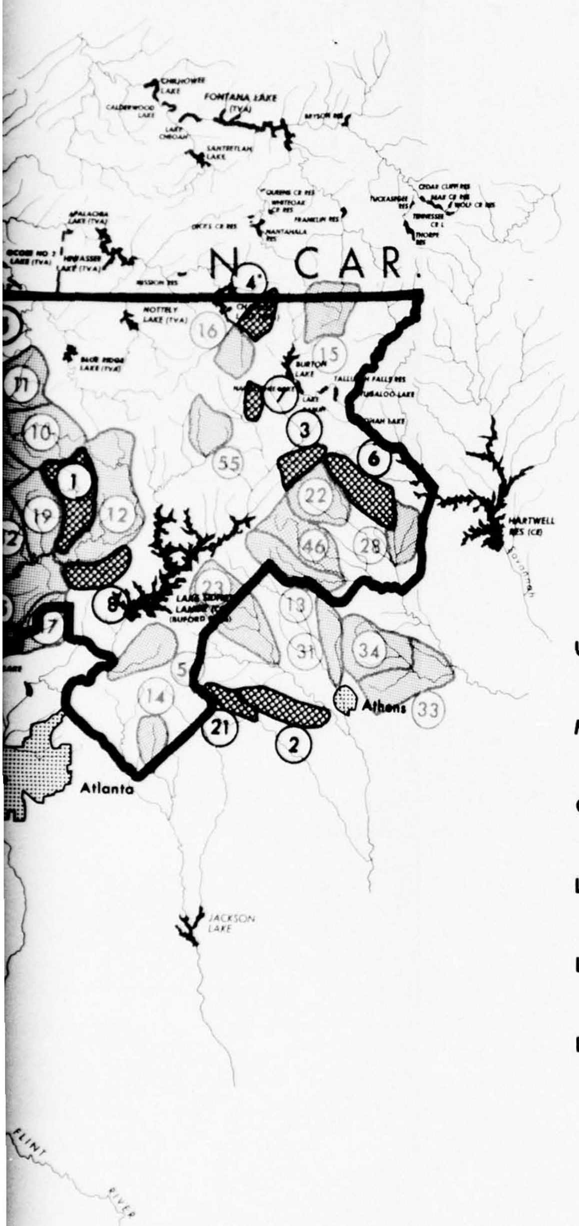

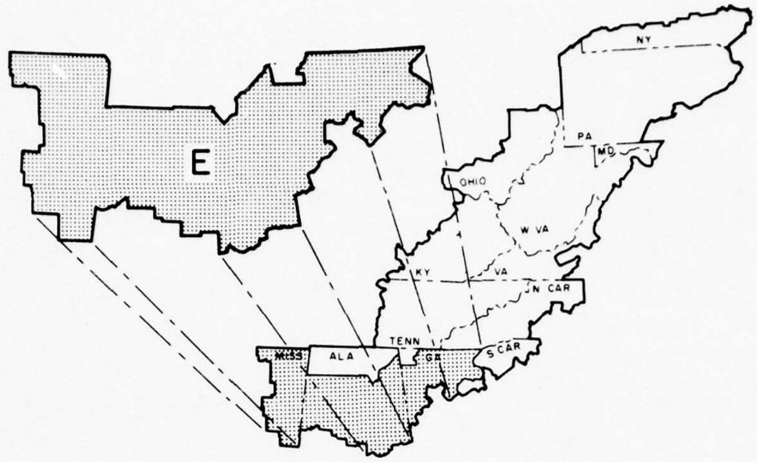

VICINITY MAP

	COMPLETED	EXPECTED TO BE COMPLETED BY 1980
UPSTREAM WATERSHEADS	3	6
MAJOR RESERVOIRS		
CHANNEL IMPROVEMENTS		
LEVEE OR WALL		
LOCK(S) & DAM		
DAM		

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

WATER RESOURCES DEVELOPMENT

OFFICE OF APPALACHIAN STUDIES JUNE 1968

FIGURE 9-14

3

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SECTION II - SOCIO-ECONOMIC STRUCTURE

4. INTRODUCTION

Planning Devices

Appalachia has been divided into ten water sub-regions, labeled "A" through "J," with their boundaries established so as to correspond as nearly as possible to physical areas created by drainage basins, and to areas of responsibility of various participating Corps of Engineer Districts, and the Tennessee Valley Authority. In delineating the water sub-region boundaries adjustments were made to accommodate the State planning sub-regions. Figure 9-15 shows the different planning areas located in Water Sub-region E.

The larger water sub-regions are disaggregated into water areas, which are designated by a letter and a number. The same general criteria as those used in delimiting water sub-regions were followed for water areas. Sub-region E has five water areas.

The Office of Business Economics has regionalized Appalachian counties into a series of twenty-seven economic sub-regions focused on trade centers. Projections made on the basis of OBE economic sub-regions have been adapted to the 10 water sub-regions and to the water areas and on a very limited basis to the 63 State planning sub-regions. (See Appendix E.) Within Water Sub-region E, portions of five OBE economic sub-regions are represented. The nine northernmost Georgia counties and DeKalb County, Alabama, are situated in Economic Sub-region 21, focused on Chattanooga. The Atlanta economic area, Sub-region 24, includes the remaining twenty Georgia counties. Economic Sub-region 25, oriented to Birmingham, consists of the central Alabama counties. The Montgomery-centered Sub-region 26 includes the five extreme southeastern Alabama counties. Economic Sub-region 27 encompasses the entire Mississippi Appalachian area.

Sixty-three state planning sub-regions, focused on urban growth centers, have been established by the Appalachian States to implement planning and administer programs on the local level. Each state planning sub-region is wholly contained within one state. The states have used various criteria in arriving at these state planning sub-regions. Some of them are closely related to physiographic factors, while others are based more nearly on trade flows and related economic characteristics. The wide differences among states in delineation methods may restrict the use of these areas for planning purposes, but this limitation has, to some extent, been overcome by use of economic sub-regions and identifying growth centers, of a variety of types and sizes.

Within each of the state planning sub-regions, the States, as part of their Appalachian development plans, have designated one or more areas of significant potential for future growth (growth areas). Such areas have been defined by the Appalachian Regional Commission as follows:

"An area consisting of an urban center or centers and their hinterland where the state has determined significant future growth is likely or can be induced.

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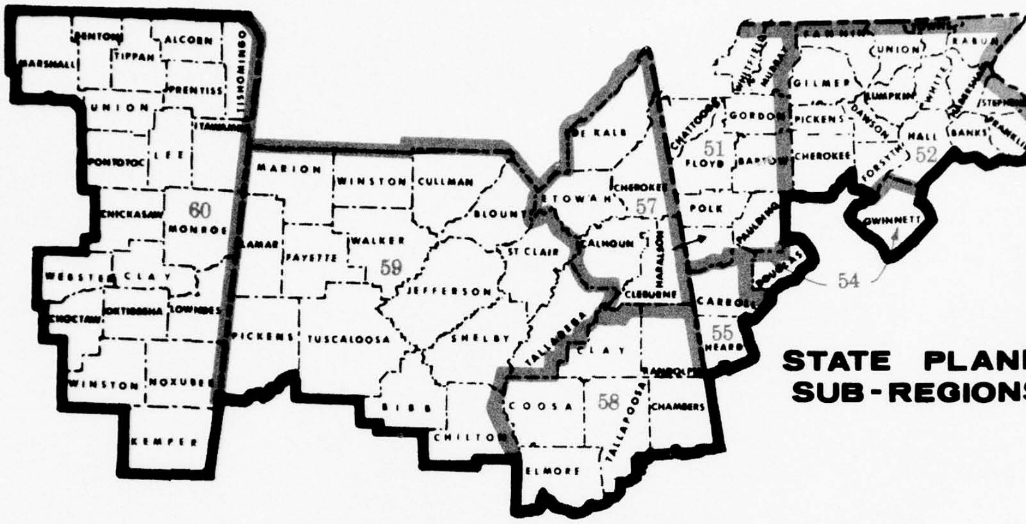
By a center or centers is meant a complex consisting of one or more communities or places which, taken together, provide or are likely to provide a range of cultural, social, employment, trade, and service functions for itself and its associated rural hinterlands. Though a center may not be fully developed to provide all these functions, it should provide, or potentially provide, some elements of each, and presently provide a sufficient range and magnitude of these functions to be readily identifiable as the logical location for many specialized services to people in the surrounding hinterland."

There are eight state planning sub-regions in Water Sub-region E. The boundaries and identification number of sub-region, along with their respective growth centers, are shown below:

State Planning Sub-region Number	Name	State	Growth Centers
52	Georgia Mountains	Georgia	Gainesville, Dahlonega, Clarkville-Cornelia-Toccoa
54	Atlanta Regional Metropolitan	Georgia	Douglasville
51	Coosa Valley	Georgia	Rome, Dalton-Calhoun, Cartersville, Summerville, Cedartown-Rockmart
55	Chattahoochee-Flint	Georgia	Carrollton-Bremen, Villa Rica
57	Northeastern Alabama	Alabama	Gadsden-Anniston,
58	Southern Alabama	Alabama	Montgomery-Wetumpka
59	South Central Alabama	Alabama	Greater Birmingham, Tuscaloosa, Fayette-Vernon-Hamilton, Talladega
60	Appalachia Mississippi	Mississippi	Columbus-Starkville-West Point, Amory-Aberdeen, Pontotac-Tupelo-Fulton, Baldwyn, Corinth-Booneville-Iuka, Holly Springs



STATE PLANNING
SUB-REGIONS

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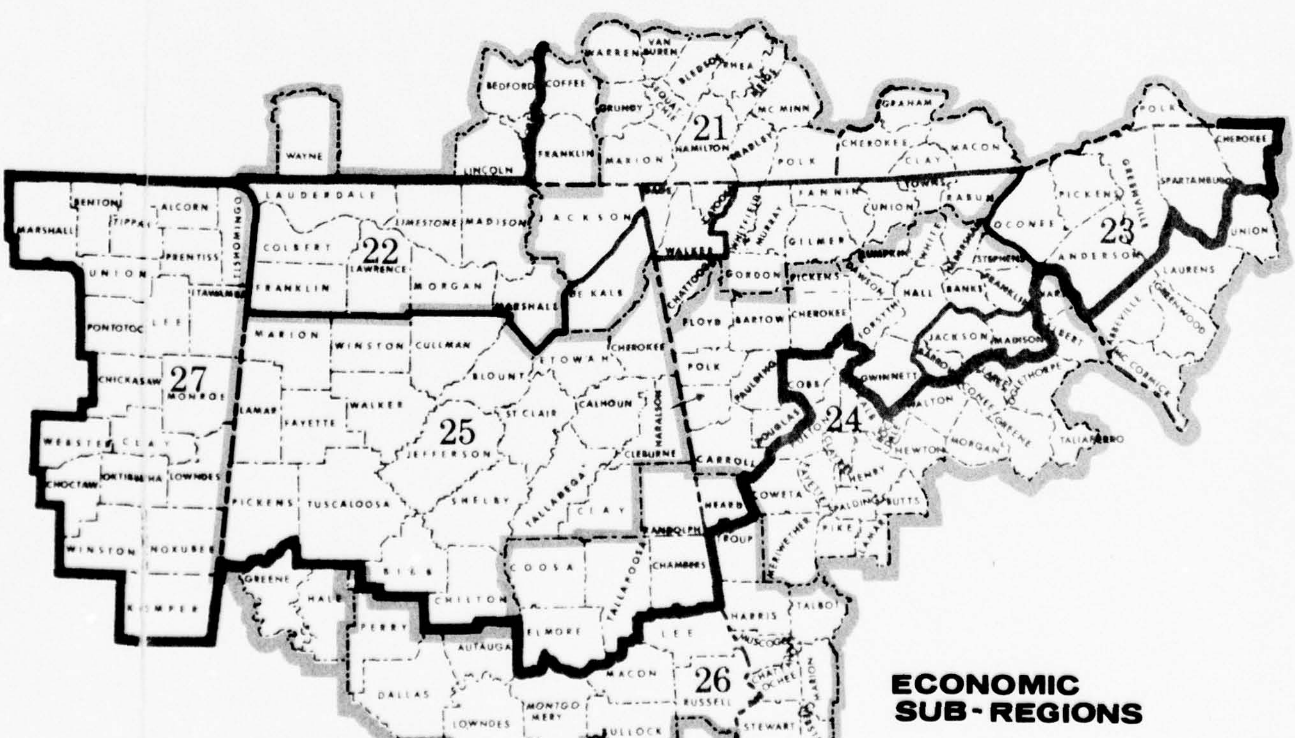

ECONOMIC
SUB-REGIONS

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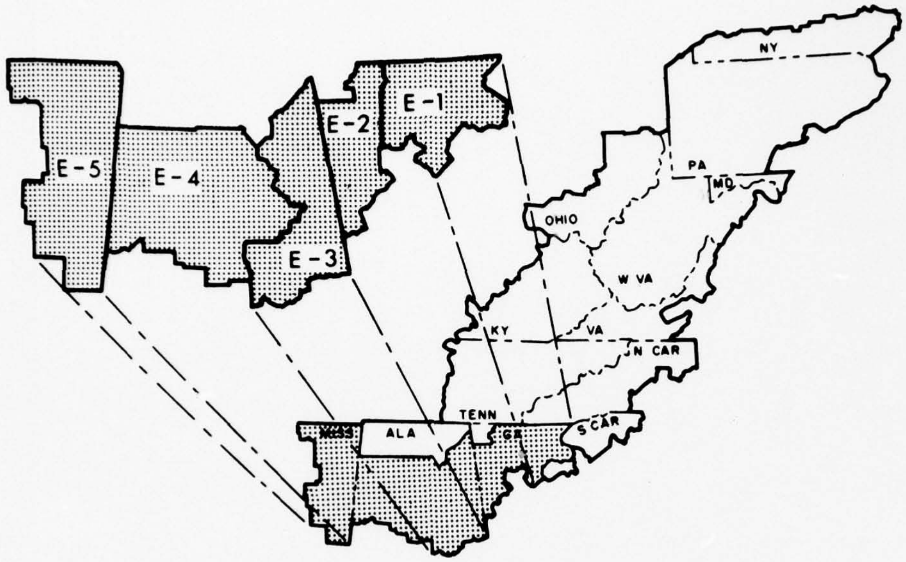
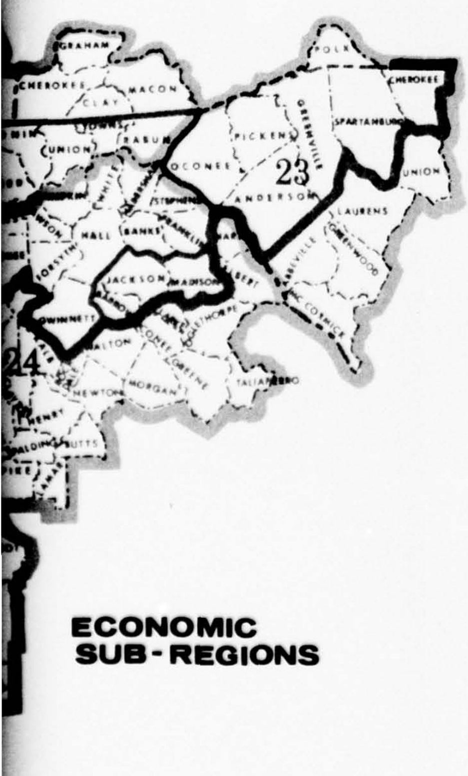


VICINITY MAP



APPALACHIAN REGIONAL BOUNDARY

ECONOMIC SUB-REGIONS

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

PLANNING AREAS

OFFICE OF APPALACHIAN STUDIES JUNE 1968

 FIGURE 9-15

3

In general, the Appalachian Regional Commission has been concerned with immediate and near future problems, whereas water resources analysis requires projections of 50 to 100 years in the future. As a result, the best current data available is that prepared by the ARC, and the long-range projections are those prepared by the Office of Business Economics for the Corps of Engineers and the benchmarks prepared therefrom by the Office of Appalachian Studies. The projections are by water sub-region and areas, while the ARC data is by state planning sub-regions.

In this chapter ARC data are utilized; therefore, the information is presented by state planning sub-regions and their associated growth centers. The long-range projections by water sub-regions and water areas follow in the next chapter.

Growth centers are emphasized in this chapter; however, it should be noted that not all projects for water resources development will be located at these centers. Some areas are not growth centers but could develop into growth centers if a water resource project is provided. Also, some projects serve wide regional interests and thus are not strictly related to local Appalachian growth centers. Examples are found in a hydroelectric power project or a major upstream development that would provide flood control, water supply or water quality control for a downstream urban area outside of Appalachia.

Three Corps of Engineer Divisions have jurisdiction over various portions of Sub-region E. The South Atlantic Division has responsibility for the major areal portion; the extreme northern tier of Alabama and Georgia is in Ohio River Division territory, while the far western portions are within the Lower Mississippi Valley Division.

Most of the sub-region lies within three major drainage areas; the Tombigbee-Warrior in Mississippi and Alabama, Alabama-Coosa in Alabama and Georgia, and the Chattahoochee in Georgia and Alabama. The Warrior River is navigable from the Jasper-Cordova area in Walker County, Alabama, southward through Mobile Bay to the Gulf of Mexico. Completion of additional locks and dams on the Alabama River will permit navigation from Montgomery to Mobile, thus providing the southeastern section of Appalachian Alabama with access to the Gulf. Linkage of the Tennessee and Tombigbee Rivers in eastern Mississippi has been authorized by Congress; when this work is completed, it will open substantial markets to the northern and western section of Appalachian Alabama and Mississippi.

The following paragraphs discuss the socio-economic characteristics of the water sub-region then go to a more intimate analysis of each State Planning Sub-region.

<u>Economic Characteristics</u>

General Andrew Jackson shattered the powerful Creek Indian Confederacy at the Battle of Horseshoe Bend in Tallapoosa County, Alabama, (Water Area E-3) on March 27, 1814. This decisive victory opened the last remaining areas of the sub-region to settlers, many from Kentucky

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and the Carolinas, who, like their predecessors in the 1700's, cleared the fertile valleys for farming and thus firmly established an agriculture-based economy that continued for over 100 years, well into the 20th century. In the early period of development, transportation was overland by difficult and sometimes hazardous routes. Later, as the region continued to grow, better roads were constructed and packet boats from Mobile began plying the Alabama River to Montgomery which served as a marketing center for areas extending into the south-central portion of the sub-region. Logs, cotton and other products of the sub-region were also transported locally along isolated reaches of the Coosa, Tallapoosa, Black Warrior, Tombigbee and several smaller rivers. By the early 1900's, river traffic had virtually disappeared, except on the Black Warrior River and the Coosa River below the "Fall Line"*/, with the advent of railroads and the growing highway system which made it uneconomical to operate the shallow-draft vessels that were required to navigate the streams in their natural state.

The growth of the sub-region, excluding the Civil War period and the chaotic Reconstruction years that followed, progressed at a fairly steady rate; by 1930, the population had increased to almost 2.1 million (See Figure 9-16). An inefficient agriculture still dominated the economy,

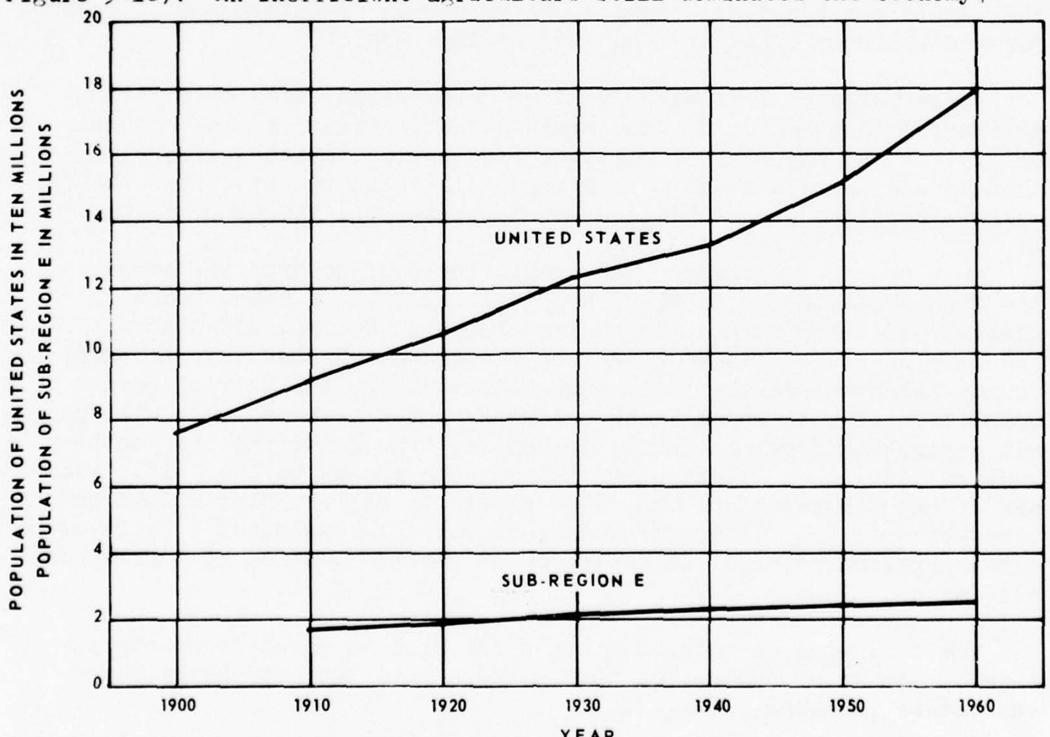

Figure 9-16. Population Trend in Sub-region E and the United States, From 1900 through 1960.

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*/ Rapids that have been formed by the erosive action of the rivers as they leave the hard rocks above the line and enter the softer formations of the Coastal Plain.

except in the Birmingham and contiguous areas. Per capita income (1954 constant dollars) of $508 annually lagged far behind the national average of $1,141 at that time. The highway and secondary road systems, though improved, were inadequate by nearly all measures of comparison with other regions outside Appalachia. Transportation of bulk commodities, with few exceptions, was handled by the railroad system which had been expanded to serve all of the principal cities and many of the smaller urban centers. Locks that were constructed previously on the Coosa River in the latter 1800's for local traffic of moderate draft were later abandoned because of the declining usefulness of a waterway with such limitations. Inland waterway traffic was limited almost entirely to the Black Warrior River which, since early in the century, was improved for navigation by a system of locks. The Great Depression years of the 1930's were an epochal period for the sub-region. Following the the trend evidenced much earlier in the Birmingham area, there began a general transition leading to a broader-based economy oriented more to industry. From the Birmingham nucleus, industrial development spread northeastward to Gadsden, Alabama, then later to Rome, Georgia, and ultimately, northward from Rome to Dalton, Georgia, on the route to Chattanooga, Tennessee. Similar development also occurred at Gainesville in the northeastern part of the sub-region as well as in several other smaller urban centers of the Georgia area. In the meantime, industrial development spilled southwestward from Birmingham to the Tuscaloosa, Alabama, area. More recently, industries have emerged in the long established agricultural area of northeast Mississippi along a corridor extending northward from Columbus through Tupelo to Corinth. The natural resources of the sub-region (particularly water), its climate and favorable labor market - all are important factors influencing this change. And there are others, such as the many potential industrial sites and economical sources of fuel, of equal or perhaps greater importance when considered in their aggregate. The impact of industrial growth on a national scale after World War II and the removal of freight rate differentials in 1947 added impetus to the trend.

Water Sub-region E, along with Sub-region D, encompasses a major portion of the southeastern United States, a region as previously stated, in transition from a dependence on agriculture to an urbanized industrial economy. The area is characterized by extreme contrasts in social and economic compositions. The extent of social problems varies widely, from Greater Atlanta where income levels are high and unemployment rates low, to rural Alabama and Mississippi where employment opportunities are limited and wage levels low. Included in the sub-region are portions of the Atlanta SMSA, the service and administration center of the southeast; Birmingham, a national center of iron and steel production; the northeast Georgia concentration of the poultry industry; the southwestern extension of the Piedmont textile belt; and the field crop regions of Alabama and Mississippi, where cotton was once of major importance.

Development in Georgia is occurring along seven delineated corridors, which are or will be served by Interstate, Appalachian, or other primary

highways. Communities in these corridors are changing from farm-market to industrial towns. Most corridors extend from the Atlanta metropolitan area toward other large southeastern cities, in particular, Birmingham; Chattanooga; and Greenville-Spartanburg, South Carolina.

An analysis of these corridor communities finds examples of virtually every stage of urban development. Calhoun, for example, is changing from a farm-market town into a limited manufacturing town. Dalton is now progressing to a specialized manufacturing center. Frequently, communities with specialized manufacturing operations attract satellite activities, based on the needs of the primary industry, which serve to diversify the industrial base; Rome, now a diversified manufacturing center, developed in this way.

The regional metropolis represents a higher stage of urban evolution, providing services to a vast region. As noted, Atlanta, on the Appalachia fringe, is the economic center for much of the southeast, and influences employment opportunities for much of Appalachian Georgia. The boundary of the Appalachian Region divides the Atlanta SMSA - Gwinnett County is in Appalachia and the remainder of the SMSA is to the south of the Region. In 1960, Atlanta was the 24th largest SMSA in the U.S. with a population in excess of one million, a 39.9 percent increase from 1950.

The number of new industries locating along highway corridors in northern Georgia continues to increase substantially. Industries that are labor-intensive, such as tufted textiles and apparel, find the labor market attractive because of the number of unemployed or under-employed persons available. Industries such as these have brought to many towns in northern Georgia and adjoining southern states new levels of economic growth.

Mechanization, fertilization, and other advances in agriculture have led to a steady attrition of small farm units. Large commercial farms have become the mainstay of agriculture. In Carroll County, for example, the number of farms decreased 55 percent between 1949 and 1959, while the size of farms increased 38 percent.

Alabama is similarly in transition from a rural, agricultural economy to an urban industrial orientation. Thirty-three plants with more than 250 employees and 228 plants with less than 250 employees located in Appalachian Alabama between 1960 and 1966. While there was some clearly discernible concentration of these new plants, they were located throughout the entire area due to the facts that topographic constraints are not so severe in Appalachian Alabama, and that urbanization has prevailed for a longer time in this area.

Growth prospects for the textile industry, which are closely related to movements in population and disposable income, are positive, as these variables have performed well in recent years; these trends are expected to continue on a nation-wide basis. Nationally, between 1950 and 1960, there was a 19 percent population increase, an increase in real disposable

income of 36 percent, and a 33 percent increase in consumers' expenditures on clothings. Between 1960 and 1965, real disposable income rose still further by 26 percent. Fantus projects an increase in the U.S. population of over 30 million in the next decade, a large part of which will be in the age group between 14 and 29. This group represents a significant part of the textile market. The dyeing and finishing stage of textile production is a potential source of water pollution. As in the case of the pulp and paper industry, adequate water pollution abatement programs will have to be developed to deal with the pollution problem.

The population and income data presented in previous sections also indicates a reasonably bright picture for the wearing apparel industry, a major source of employment for women in the area. This industry is now established in smaller communities and, in order to support more of these firms, it will probably be necessary to draw on the female labor force from other areas. In some locations there is some reluctance of husbands to allow wives to commute substantial distances to work. This may be reduced by the existence of a good network of roads in most areas, which will facilitate the movement of female labor from one area to another.

The outlook for the pulp and paper industry is bright. An abundance of both water and timber provides a probable comparative advantage, both now and for the future. The industry has been growing faster locally than it has nationally, and there are no purely economic constraints on a successful future performance. However, this industry is capable of creating substantial pollution problems, and unless the states (this refers almost exclusively to Alabama) prepare for this, eventually substantial costs may be imposed upon the areas polluted.

The U.S. Department of Agriculture reported that agriculture sales for the region increased from $235.5 million in 1949 to $532.6 million in 1964 based on 1957-59 prices. The majority of this increase was for poultry and poultry products, an industry located almost entirely in Water Area E-1 (Georgia) centering around Gainesville. The value of Sub-region E's agricultural products sold, by commodity, is shown in Table 9-9.

The locational characteristics of the area which have attracted the iron and steel industry appear to be slowly changing, as the traditional natural resource base of the area seems to have lost some of its attractiveness. Alabama more than doubled its imports of iron ore between 1955 and 1964, which could imply that the traditional cost advantages obtained from mining the ore domestically are declining. Improved technology in the use of low grade ores may change this trend. In addition, it is possible that the area is losing its advantage in providing coal to the industry, as bituminous coal production in Alabama had a declining secular trend between 1917 and 1965. During this period production declined from 20 million to 15 million tons. Birmingham, Alabama, had been the locational center of the coal industry in the past.

TABLE 9-9

VALUE OF ALL FARM PRODUCTS SOLD, SELECTED YEARS
1949-64, ADJUSTED BY WHOLESALE COMMODITY PRICE INDEX (1957-59=100)

ITEMS SOLD	YEARS							
	1949		1954		1959		1964	
	$ 1,000	%	$ 1,000	%	$ 1,000	%	$ 1,000	%
Crops:								
Field	118,303	88.8	127,390	89.8	100,362	86.3	129,929	90.1
Vegetables	2,953	2.2	3,077	2.2	2,573	2.2	3,213	2.2
Fruits & Nuts	1,663	1.3	3,798	2.7	3,220	2.8	1,283	0.9
Forests*/ & Horticultural	10,241	7.7	7,546	5.3	10,096	8.7	9,793	6.8
Sub-Total	133,160	100	141,811	100	116,251	100	144,218	100
Percent of all Farm Products		56.5		48.7		31.3		27.1
Livestock and Livestock Products:								
Poultry & Poultry Prod.	47,254	46.2	95,752	64.2	169,080	66.4	301.013	77.5
Dairy Products	23,227	22.7	25,334	17.0	31,327	12.3	38.447	9.9
All Other	31,840	31.1	28,084	18.8	54,305	21.3	48.886	12.6
Sub-Total	102,321	100	149,170	100	254,712	100	388,346	100
Percent of all Farm Products		43.5		51.3		68.7		72.9
Total Farm Products	235,481		290,891		370,963		532,564	

*/ Includes forest products sold from farms only.

Source: U.S. Census of Agriculture.

With much of the iron ore used by the industry now being imported from Venezuela through the Port of Mobile, plant locations which can utilize navigable streams from Mobile will have a transportation advantage. Another problem confronting the steel industry is the inroads made by foreign steel producers into the U.S. market for finished and semi-finished steel products. This reflects a growing comparative advantage in foreign countries in the production of iron and steel.

In Water Sub-region E, the population is grouping into centers of economic activity. Of the 2.5 million people in the sub-region in 1960, a total of 915,000 were located in the SMSA's. The significance of this lies in the realization that 28 percent of the population was located in 5 of the 75 counties. More than 50 percent of the population was located in the previously described growth centers.

Agriculture, although still an important factor in the sub-region's economy, now plays a secondary role from an employment standpoint. The emphasis throughout the region is upon accelerated industrial development. In 1960, one of every three workers was employed in manufacturing with the remainder largely engaged in commercial or service occupations (See Figure 9-17). Employment in agriculture has continued to decline so that in 1960 only one in eight persons was engaged in this pursuit. This reflects the extensive mechanization that is occurring in the agricultural field (in keeping with the national trend), the declining acreage used for row cropping and the increase in livestock raising which requires relatively few workers. Employment in mining, largely iron ore and coal in the central Alabama area, has also declined to relatively small proportions as a result of increased mechanization in the mining process, the depletion of high-grade iron ore deposits and large-scale changes to natural gas and other fuels for industrial and domestic purposes.

Unemployment during the transition of the sub-region from a predominantly agricultural area has been a problem. Many of the workers released from agriculture have been absorbed by new and expanding industries but others, lacking in education and training, were added to the ranks of the unemployed. In recent years, however, unemployment as a whole has been reduced significantly to levels somewhat comparable with the Nation at large, except in the Mississippi sector and some local areas in Georgia and Alabama. Much of the decline is attributable to job opportunities afforded by the increased industrial activity but some is the result of out-migration of unemployed workers. The number of unemployed persons in the sub-region actively seeking work in 1966 was about 40,000, a decrease of about 38 percent since 1960. The unemployment rate by county in 1966 is shown in Figure 9-18. At that time, as in 1960, two of every three unemployed persons were male and the majority were skilled or semi-skilled. The unemployment rate in the same period declined from 6.9 percent to 4.2 percent.

Family income in the sub-region is also well below the national average, even with the substantial industrialization that has taken

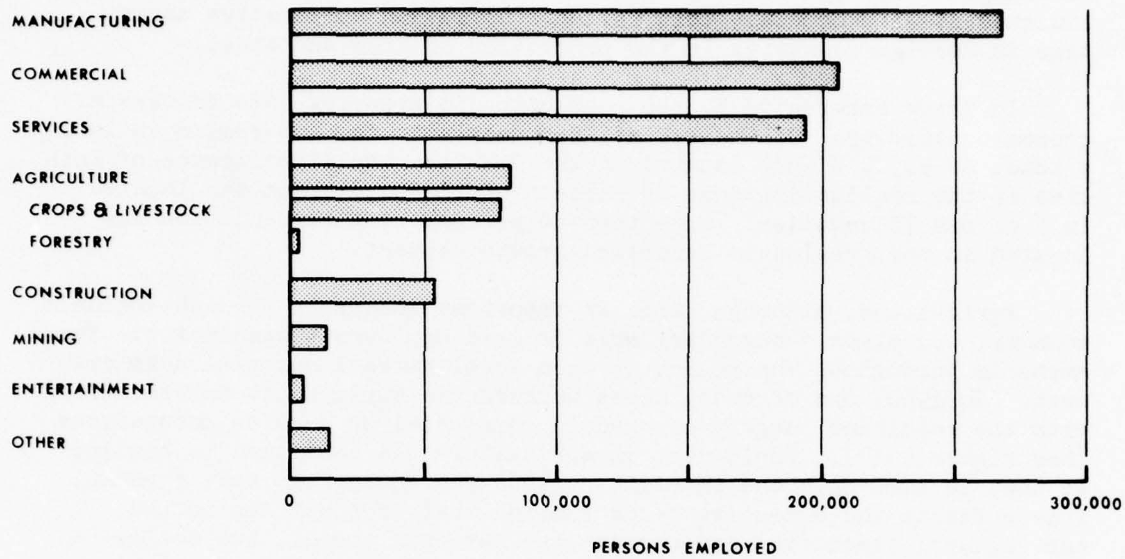
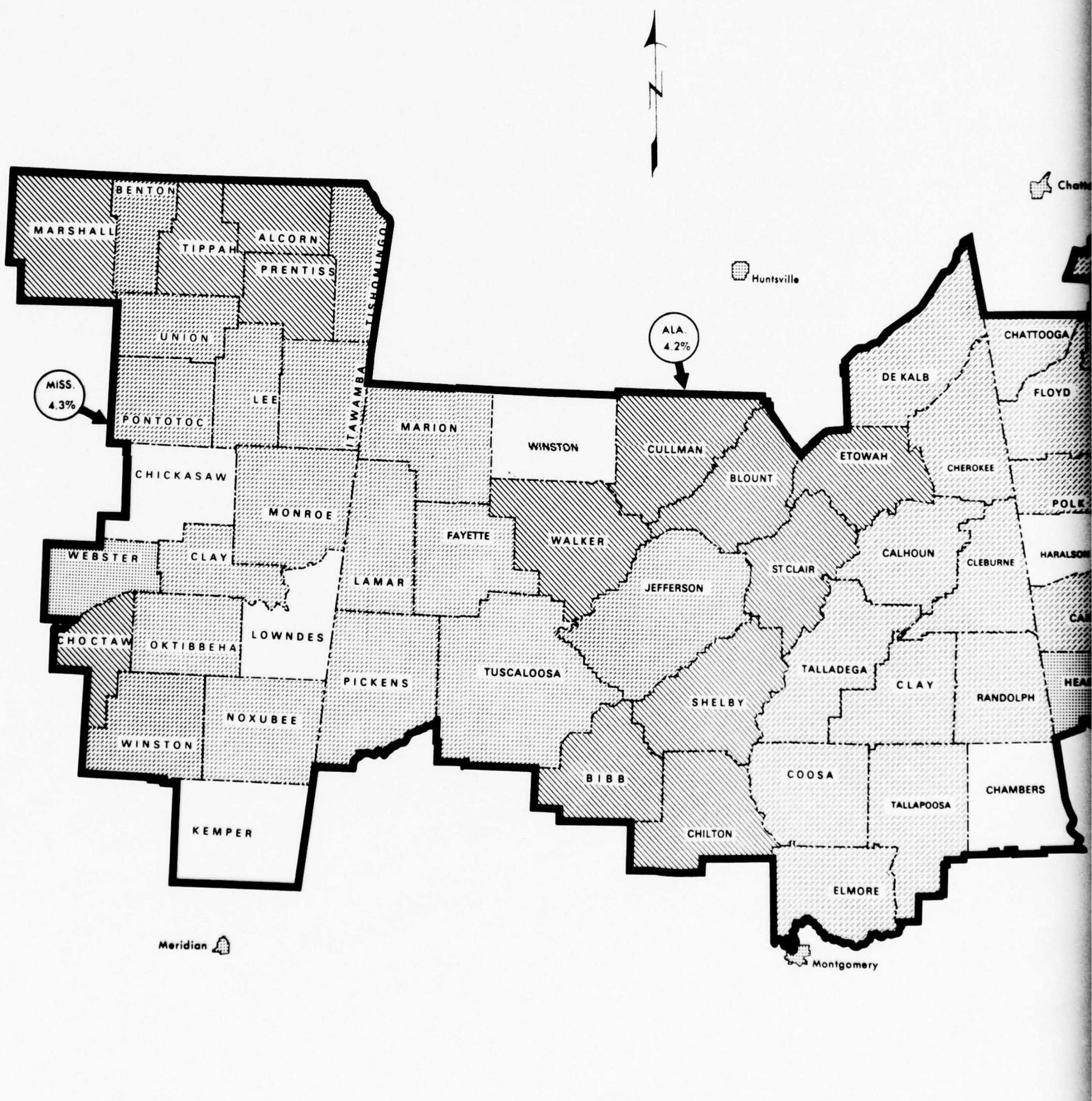


Figure 9-17. Sub-region E Employment by Major Employment Categories in 1960

place over the past several decades. Industrial development, from an overall standpoint, has been on a "crawl before you walk" basis. The labor market as well as other factors are attractive to low-wage industries, such as apparel manufacturing, and they have been encouraged to locate in the region. This has been more effective in alleviating the unemployment problem than raising the general income level which will require a diffusion of diversified industries paying substantially higher wages.

Distribution of family income in the sub-region in 1960 is illustrated on the following pie chart (Figure 9-19). As shown on the chart, approximately 40 percent of the sub-region's families, or almost twice the rate for the United States as a whole at that time, had an annual income of less than $3,000, and 34 percent received from $3,000 to $6,000 per year. The remaining families, about 26 percent, received over one-half of the total income generated. Per capita income (1954 constant dollar), ranging from $940 in Water Area E-5 to $1,539 in Water Area E-4, averaged $1,338 compared to the national average of 1,994 dollars.



MARSHALL
BENTON
TIPPAH
ALCORN
PRENTISS
TISHOMINGO
UNION
LEE
ITAWAMBA
PONTOTOC
MISS. 4.3%
CHICKASAW
MONROE
WEBSTER
CLAY
CHOCTAW
OKTIBBEHA
LOWNDES
WINSTON
NOXUBEE
KEMPER
Meridian
MARION
LAMAR
FAYETTE
PICKENS
TUSCALOOSA
WINSTON
WALKER
CULLMAN
ALA. 4.2%
Huntsville
BLOUNT
JEFFERSON
SHELBY
BIBB
CHILTON
ETOWAH
ST CLAIR
TALLADEGA
COOSA
ELMORE
Montgomery
DE KALB
CHEROKEE
CALHOUN
CLEBURNE
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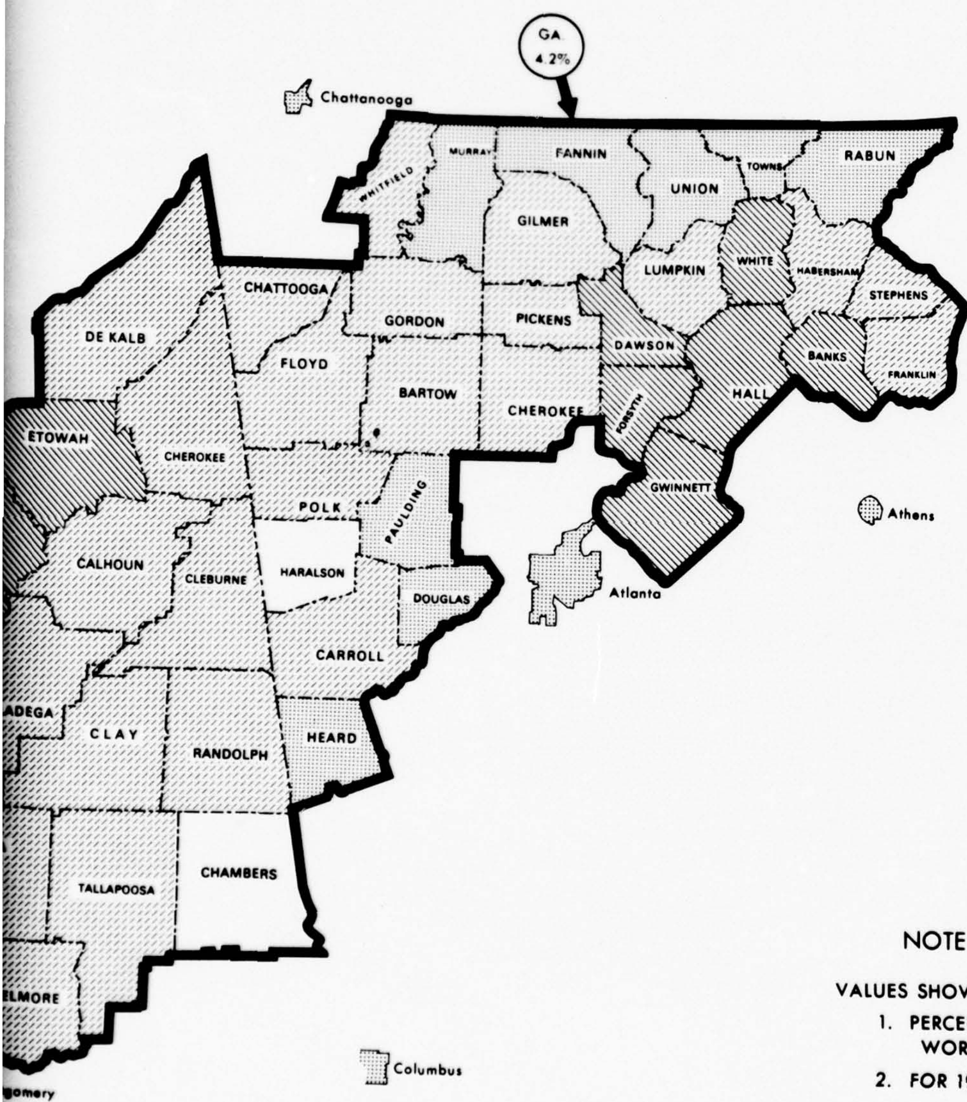

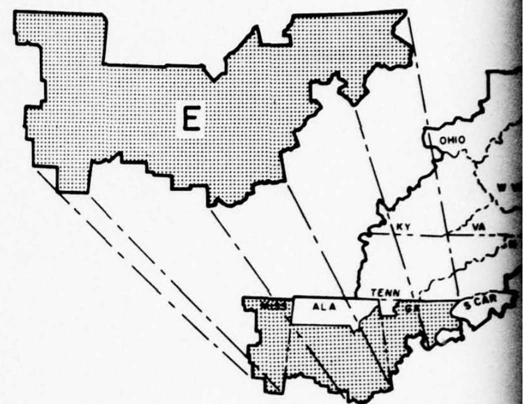

VICINITY M

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TOTALS

NOTE

VALUES SHOWN ARE:

1. PERCENTAGE OF CIVILIAN WORK FORCE
2. FOR 1966

10 5 0 10 20 30 40 50
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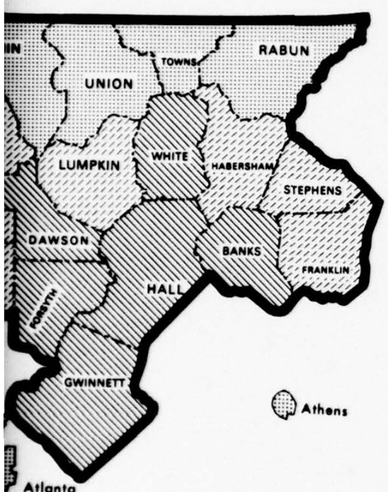

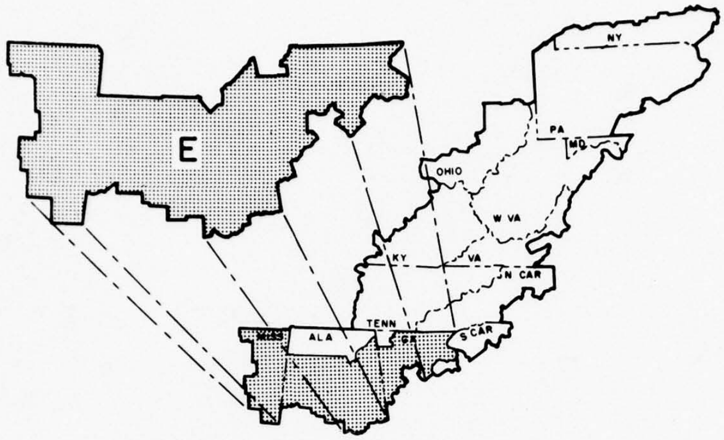

VICINITY MAP

LEGEND

COUNTIES HAVING LESS THAN 3.0%

COUNTIES HAVING 3.0%—4.9%

COUNTIES HAVING 5.0%—6.9%

COUNTIES HAVING 7.0% & OVER

TOTALS IN SUB-REGION, BY STATE

NOTE

VALUES SHOWN ARE:

1. PERCENTAGE OF CIVILIAN WORK FORCE
2. FOR 1966

REPORT FOR
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IN
APPALACHIA

WATER SUB-REGION E

UNEMPLOYMENT

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 FIGURE 9-18

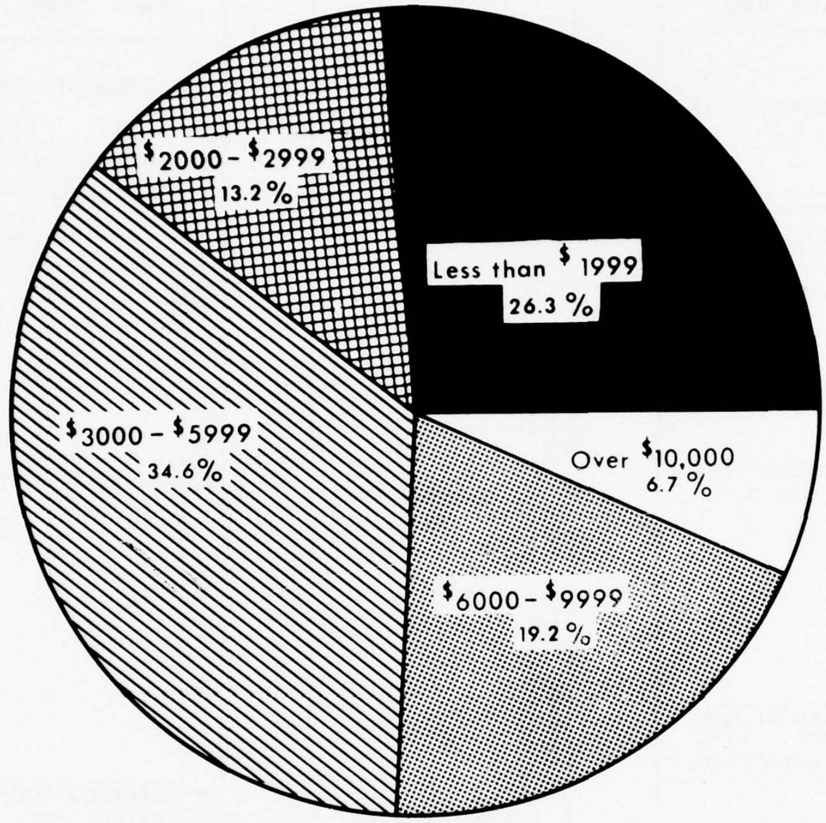

Figure 9-19. Distribution of Family Income, In Sub-region E, 1960

The source of income for the sub-region is depicted in Figure 9-20 which shows the percent of earnings by broad industrial sector for Sub-region E, Appalachia, and the United States. Farm earnings are high and those for mining low for the sub-region, while the remainder of the sectors are similar to those for Appalachia as a whole. Compared to the U.S., the sub-region is higher for manufacturing and lower for the trade and service sectors.

Basic (export) employment comprised 41 percent of the sub-region's total employment in 1960 for a ratio of 1 to 1.4, basic-nonbasic. Based on a planning standard of 1 to 2, which is generally used as a planning guide, and in view of the heavy employment in manufacturing in Water Area E-4, the total sub-region's economy is slightly export oriented.

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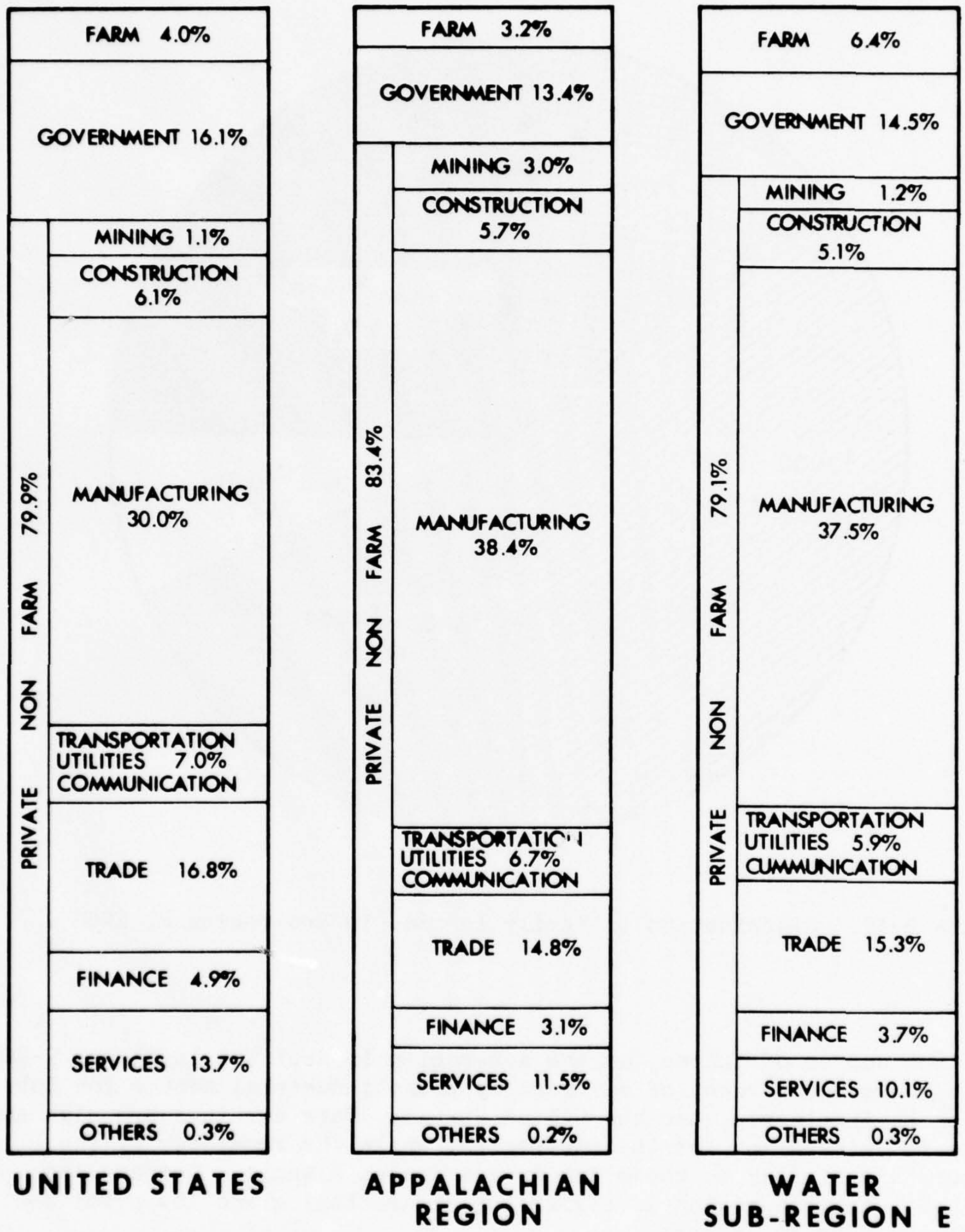


FIGURE 9-20 SOURCES OF INCOME, 1966

SOURCE: OBE, U.S. DEPT. OF COMMERCE

Capital Availability

In 1966, deposits in State and Federal banks in the sub-region totaled approximately $2.5 billion with over one-half of the total being concentrated in the western Alabama portion (primarily, the greater Birmingham area). Deposits per capita, shown by county in Figure 9-21, ranged from about $750 in Water Area E-1 to $1,190 in Water Area E-4. At the same time there were 52 savings and loan associations in the sub-region with total assets of more than $800 million. Other financial institutions include mortgage and lending companies, credit unions, and similar organizations common to regions throughout the United States.

Financial assistance is also available from various departments and agencies of the Federal government. Long-term loans are provided by the U.S. Department of Housing and Urban Development for the development of municipal utilities. These loans are also available for certain rural areas for the development of water distribution districts, sewer districts and other similar improvements. In addition, financial assistance is provided by the Economic Development Administration, for the development of water resource and other employment generating projects, and by the Department of Health, Education and Welfare and the Federal Water Pollution Control Administration for water supply and treatment and other facilities.

Several agencies of the U.S. Department of Agriculture including the Farmers Home Administration make loans or provide other financial assistance for improvements for water supply and treatment and distribution systems, sewage systems, recreation developments and upstream watershed improvements. Loans are also made by the Rural Electrification Administration to electric cooperatives to initiate, expand or improve electrical and telephone service in rural areas.

It should be emphasized that capital is mobile and will flow into any of the water areas of the sub-region from various sources should profitable investment opportunities develop. Nearby Atlanta is one of the Nation's major financial centers.

Local Attitudes

Generally, local attitudes toward new growth in the sub-region have been cooperative and constructive. There is a keen awareness of the need for industrial development, and projects influencing the sub-region's competitive position in obtaining new industries usually receive top priority. Local Chambers of Commerce have formed action committees to promote industrial growth. This has been effective in developing an aggressive climate which makes the area attractive to new industries and commerical enterprises. Favorable local attitudes are further evidenced by the numerous planning agencies at the state and local levels of government, quasi-public planning and development agencies, such as the Tombigbee River Valley Water Management District, and the several privately sponsored development organizations in the area.

Inhabitants of the sub-region are now and have long been aware of the need for development and enhancement of its water resource potentials. There are increasing indications of their awareness of the necessity for planning these developments on a comprehensive basis, to meet long-range needs that can be anticipated. Their record for fulfilling the requirements of local cooperation for participation in the construction of water use improvements by the Federal government is generally good. In areas where some difficulty has been experienced in obtaining local cooperation, the reason could often be traced to the reluctance of individuals to give up lands required for the improvements. The lack of proper organizations to handle matters of local cooperation and inadequate financial resources on the local level were other reasons.

5. WATER AREAS

The five water areas in Water Sub-region E have been divided into eight state planning sub-regions. The delineation of state planning sub-regions within Water Sub-region E has been described and discussed in Paragraph 4, and is indicated on Figure 9-15. The state planning sub-regions are used in Sub-region E as the principal geographic division for display of economic data. Graphical comparisons of the state planning sub-regions with the water sub-region have been included in each of the following sections to aid in orienting the reader to the state planning sub-region.

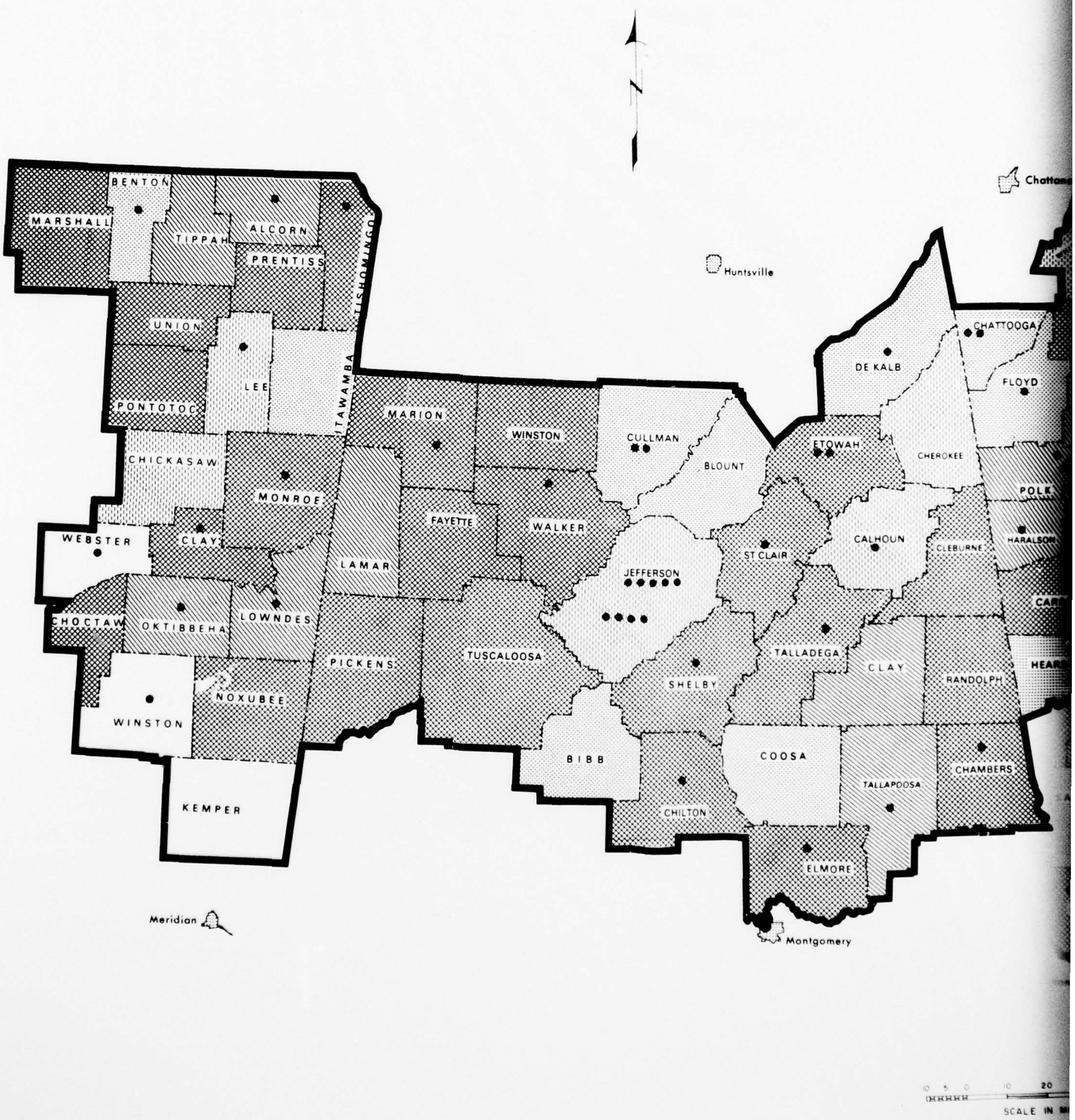
Water Area E-1

Water Area E-1 contains Georgia State Planning Sub-region 52 and one county, Gwinnett County, in Georgia, State Planning Sub-region 54.

State Planning Sub-region 52

State Planning Sub-region 52, situated in the extreme southern section of the Appalachian Highland and the northern fringe of the Piedmont Physiographic Provinces, is composed of 16 Georgia counties. While the region generally, and certain counties specifically, are experiencing a fairly rapid industrial and agricultural growth, the more rural and isolated counties remain largely underdeveloped and are core problem areas.

Although agriculture was virtually the only economic activity throughout the region until well into the 20th Century, industrial development has occurred extensively since World War II. This industrialization has been based primarily on processing agriculture products, and on the utilization of inexpensive, unskilled labor in textile and other labor intensive industries. Today manufacturing has surpassed agriculture as the primary employment sector, the major products being textiles, apparel, and processed poultry. The sub-region, especially the Gainesville/Hall County section, is one of the primary poultry producing regions in the nation; agriculture operations are geared towards the raising of poultry for local industry.



Chattanooga
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MONROE
WEBSTER
CLAY
CHOCTAW
OKTIBBEHA
LOWNDES
WINSTON
NOXUBEE
KEMPER
MARION
LAMAR
FAYETTE
PICKENS
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CULLMAN
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CALHOUN
TALLADEGA
COOSA
ELMORE
CHATTOOGA
FLOYD
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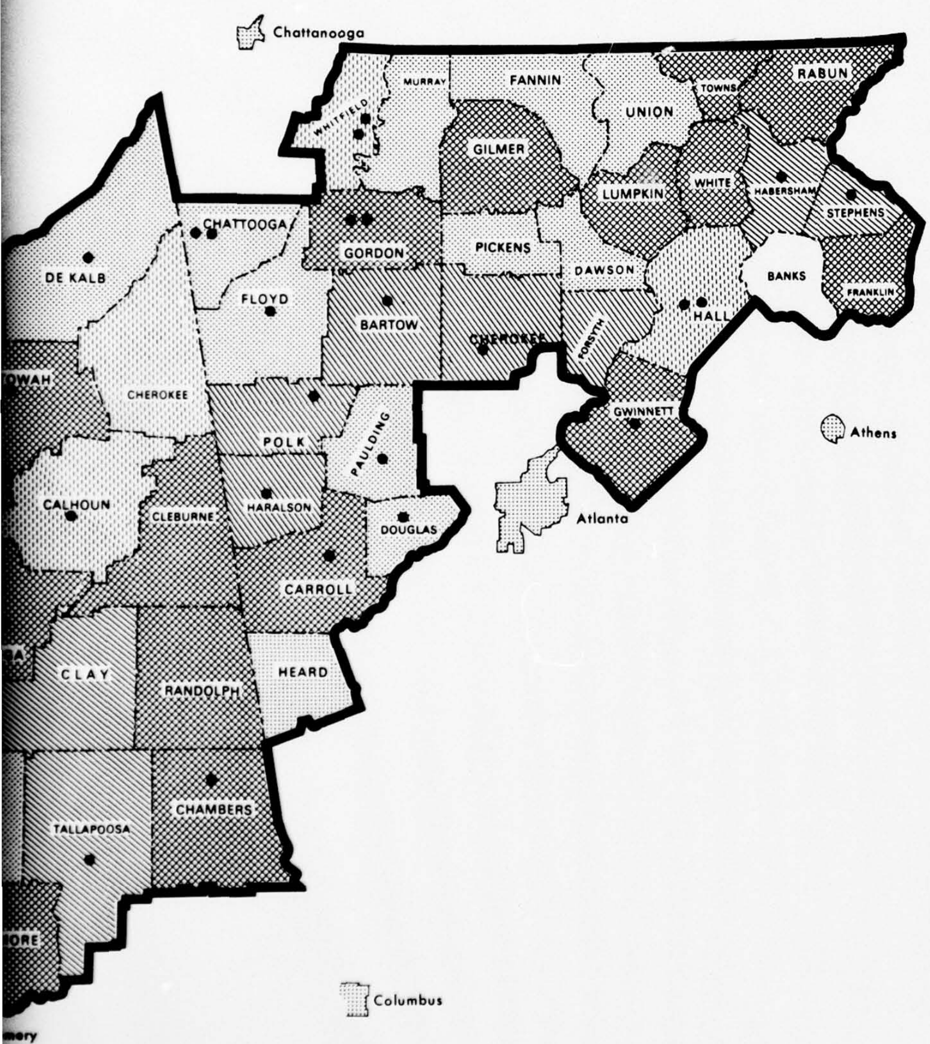
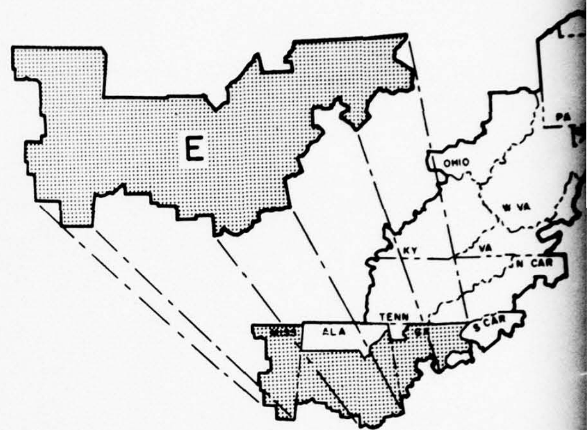


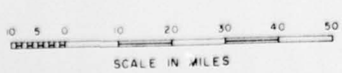


VICINITY MAP

LEGEND

BANK DEPOSITS PER CAPITA

- $0.00-299
- $300-499
- $500-799
- $800-999
- $1000-1999
- ● SAVINGS & LOAN ASSOCIATIO



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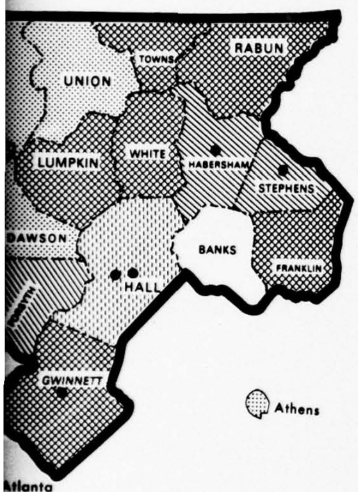

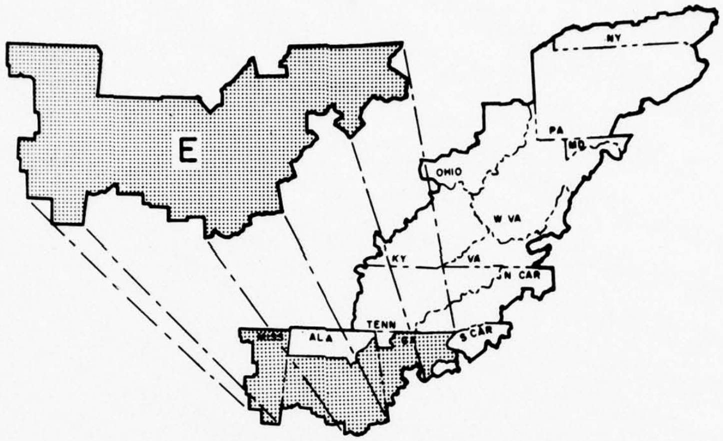

VICINITY MAP

LEGEND

BANK DEPOSITS PER CAPITA

- $0.00-299
- $300-499
- $500-799
- $800-999
- $1000-1999
- ● SAVINGS & LOAN ASSOCIATION

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

FINANCIAL SITUATION

OFFICE OF APPALACHIAN STUDIES JUNE 1968

 FIGURE 9-21

3

The population of Sub-region 52 increased from 208,903 in 1960 to 221,400 in 1966, a net increase of approximately 6 percent. Out-migration, however, has continued to persist but is estimated to be decreasing.

Unemployment, though high, is declining. The 1965 rate of 5.3 percent, or 3,800 persons, is a significant reduction from the 1963 high of 9.7 percent. Increases in the number of low-skill work opportunities in recent years are absorbing the chronically unemployed.

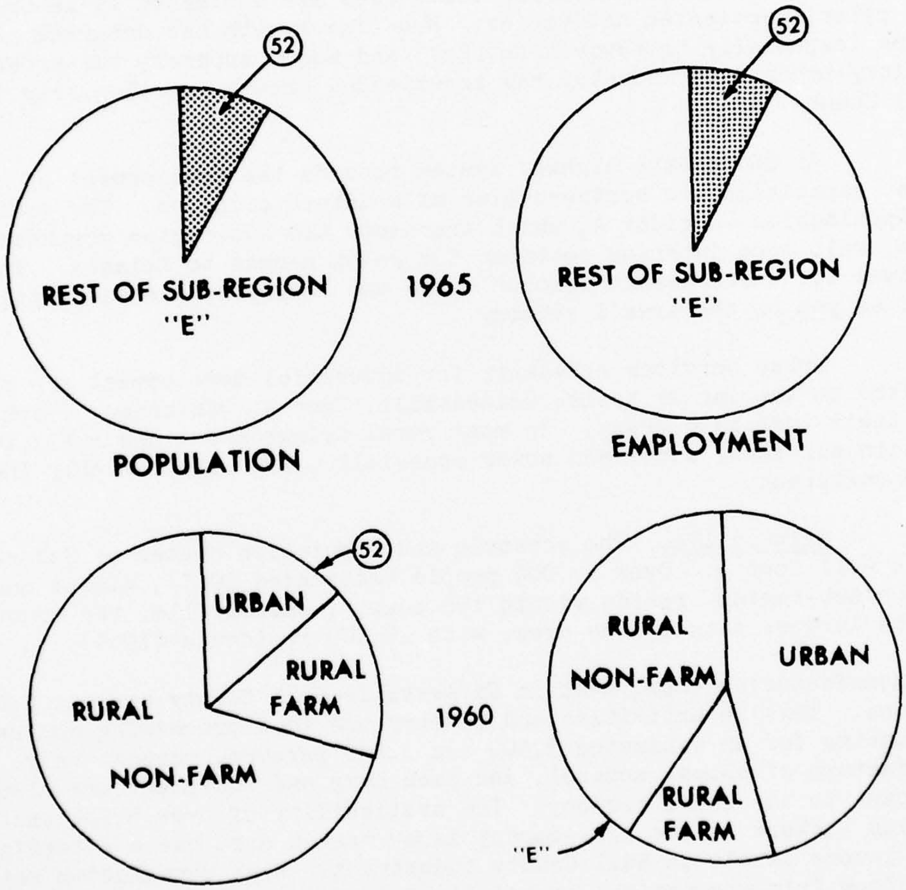

Figure 9-22. Population, Employment, and Urban-Rural Population Distribution of State Planning Sub-region 52 Compared to Sub-region E

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The physical resources of the sub-region present several areas for significant development. Although a variety of minerals are found, only marble and granite are of economic importance; mining activities are concentrated almost exclusively in Pickens County. An abundant timber resource exists in all the sixteen counties, but the majority of the processing activities occur outside the area.

Agriculture, the basis for a large part of the industrial employment, consists primarily of the raising of poultry and livestock. Corn is the major field crop.

Existing manufacturing industries are dominated by labor-intensive raw material-oriented activities. New-line growth has occurred in textiles (especially broadwoven fabrics) and men's apparel; the established poultry-processing industry has experienced growth, particularly in Hall County.

An inadequate highway system retards the development of much of the area, especially the northern tier of mountain counties. The construction of Appalachian Corridor A, which transects the sub-region northeast/southwest, will open interior sections for ready access to Atlanta. Interstate Highway 85, which passes through Banks and Franklin, has had little effect as yet on the area's economy.

Urban services necessary for industrial development are mainly limited to the larger towns, Gainesville, Toccoa, Dahlonega, Clarksville, and their immediate areas. In most rural fringe areas and small towns, certain services, water and sewer especially, are either highly inadequate or nonexistent.

Gainesville. The economic and population center of Sub-region 52 is Hall County. Over 54,000 people (estimated 1965), almost one-third of the sub-region, reside within the county; Gainesville, the county seat, is the largest city in the area, with 18,500 residents (1965).

Manufacturing employment in Gainesville-Hall County exceeds 9,000 persons. Textile activities and poultry and food processing dominate, accounting for an estimated 3,500 and 3,200 persons, respectively. The manufacture of shoes, apparel, and machinery and equipment are also significant to the local economy. The availability of over 5,000 unskilled surplus workers in the nine-county labor market area has a retarding effect upon income levels in Hall County industries. High commutation rates into Hall from fringe counties, especially from Gwinnett, Dawson, Lumpkin, Habersham, White, Banks, and Jackson, reflect the importance of the county as the major employment center of the Georgia mountain area.

Gainesville provdes the major retail, wholesale, and service functions for the sub-region and is, therefore, the center of most such employment. Atlanta exerts a considerable economic dominance throughout the area, however, and has significantly held back the development of service and trade functions.

Toccoa - Cornelia - Clarksville. Toccoa, the second largest town in the sub-region (7,740, estimated 1965 population) is the only other area of significant development. Industrialization is occurring at a rapid rate. Unlike other areas of the sub-region, much development is among the durable goods industries, primarily metal-working and heavy construction machinery; textiles and furniture are nonetheless important. In 1965, an estimated 47 percent of the Stephens County population was engaged in manufacturing, the high for Sub-region 52; projections to 1985 indicate the current growth trend will continue.

Cornelia, to the southwest of Toccoa in Habersham County, and the corridor between Cornelia and Toccoa along Highway 123, are viewed as potential areas for growth. The economy of this area is dominated by consumer goods industries, primarily textile and apparel plants, and food processing acitvities.

These areas have no natural advantages for growth, being located in rugged terrain and fairly distant from the regional expressway networks. The future development of these towns will be greatly dependent upon the ability of the rural hinterland to provide a continuing labor force and the reversal of the trends of out-migration.

Clarksville, in Habersham County, is similar to the Cornelia area in character of development: textile-apparel operations dominate the economy and no growth has occurred in durable goods activities. Transportation to major markets is also difficult, because of inadequate facilities.

Dahlonega. In the mountains area the only center of growth potential is Dahlonega, in Lumpkin County. Although significant industrialization has yet to occur, the construction of Appalachian Corridor A is expected to greatly enhance the attractiveness of the city. The area of largest economic growth is the tertiary sector: Dahlonega serves as a minor service center for the rural mountains region and is the site of North Georgia College.

The tabulations in Tables 9-10 and 9-11 present the most recent census data for the sub-region.

TABLE 9-10
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
GEORGIA STATE PLANNING SUB-REGION 52

	1950	1960	Absolute Change
TOTAL ALL SECTORS	64,982	70,877	5,895
PRIMARY ACTIVITIES	21,133	9,992	-11,141
Agriculture	20,116	8,802	-11,314
Forestry & Fisheries	123	187	64
Mining	894	1,003	109
SECONDARY ACTIVITIES	22,548	31,760	9,212
Contract Construction	3,516	4,922	1,406
Food & Kindred Products	1,781	3,835	2,054
Textile Mill Products	7,026	8,639	1,613
Apparel	1,213	3,524	2,311
Lumber, Wood Products, Furniture	6,224	4,663	- 1,561
Printing & Publishing	219	327	108
Chemicals & Allied Products	364	338	- 26
Electrical & Other Machinery	434	920	486
Motor Vehicles & Equipment	185	605	420
Other Transportation Equipt.	5	759	754
Other & Miscellaneous	1,581	3,228	1,647
TERTIARY ACTIVITIES	20,354	27,904	7,550
Transportation & Communications	1,603	2,050	447
Utilities & Sanitary Service	503	666	163
Wholesale Trade	1,039	1,688	649
Retail Trade	7,100	9,055	1,955
Finance, Ins. & Real Estate	576	1,301	725
Personal Services	4,178	5,366	1,188
Professional Services	3,740	5,665	1,925
Recreational Services	225	238	13
Public Administration	1,331	1,780	449
Armed Forces	59	95	36
NOT REPORTED	947	1,221	274

TABLE 9-11
SOCIO-ECONOMIC CHARACTERISTICS
GEORGIA STATE PLANNING SUB-REGION 52
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1966	
Total	221,400
Absolute Change 1960-1966	12,500
Percent Change 1960-1966	5.98

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	208,903	102,971	105,932	33,161	146,373	29,369
Percent Distribution	100.00	49.29	50.71	15.87	70.07	14.06
Percent Change 1950-1960	6.45	5.62	7.27	77.43	-64.08	37.03

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	14,707	8,303	19,188	7,893	2,071	52,162
Percent Distribution	28.19	15.92	36.79	15.13	3.97	100.00
Percent Change 1950-1960	-50.57	11.67	177.89	886.62	681.51	12.01

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	107,633	62,714	32,473	9,468
Percent Distribution	100.00	58.27	30.17	8.80
Percent Change 1950-1960	10.06	-5.13	57.79	37.72

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	70,782	3,562	48,833	2,201	21,949	1,361
Percent Distribution	95.21	4.79	95.69	4.31	94.16	5.84
Percent Change 1950-1960	9.02	56.09	-3.41	58.35	52.76	52.58

RATE OF UNEMPLOYMENT, 1962-65

1962	7.8
1963	9.7
1964	6.5
1965	5.3

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	74,439	71,036	51,125	19,696	23,314	51,340
Percent Distribution	51.17	48.83	72.19	27.81	31.23	68.77
Percent Change 1950-1960	10.67	6.20	-1.68	41.32	52.70	-3.04

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	70.8	3.6	5.4
Tot. Employment	67.0	5.0	8.1
Unemployment	3.8	-1.4	-26.9

State Planning Sub-region 54

Although Atlanta proper is not included in the Appalachian Region, Gwinnett, in the Atlanta SMSA and Douglas, on the Atlanta Metropolitan fringe, compose State Planning Sub-region 54.

This spatial proximity to the major economic center of the South has resulted in an area quite different from other portions of Georgia Appalachia. Both counties have benefited greatly from the prosperity of Atlanta. Growth has been a characteristic in the sub-region for over a decade. An intense and dominant residential function is rapidly evolving. A local economic base has, in large, failed to develop, even in the low-wage, low-skill textile, apparel, and food-processing industries common to other Georgia Appalachian counties. Douglas and Gwinnett Counties display strong ties to, and an economic dependence on Atlanta. As components of the Greater Atlanta area, these counties, Gwinnett, in particular, reinforce the economic attraction to Atlanta of other counties in Economic Sub-region 24 delineated by the Office of Business Economics.

As would be expected, population characteristics uncommon to much of Appalachia are apparent in the sub-region. The estimated population in 1965 was 72,600, an increase of greater than 20 percent over the 1960 total. Although absolute and relative gains were greater in Gwinnett (11,059 persons, 25.5 percent), Douglas exhibited a population growth of nearly 8 percent, considerably greater than the majority of Appalachian counties. The 1960-1965 net migration rate into Gwinnett, 16.7 percent ranks among the highest in Appalachia.

Population growth in the sub-region is more than a recent phenomenon, however. From 1950-1960, population increased by over 32 percent in Douglas and nearly 35 percent in Gwinnett. Both counties experienced high net migration rates - 12.7 percent in Douglas, 15.9 percent in Gwinnett - while net migration losses were recorded for the state as a whole, the Appalachian portion of Georgia, and the non-Appalachian Georgia counties.

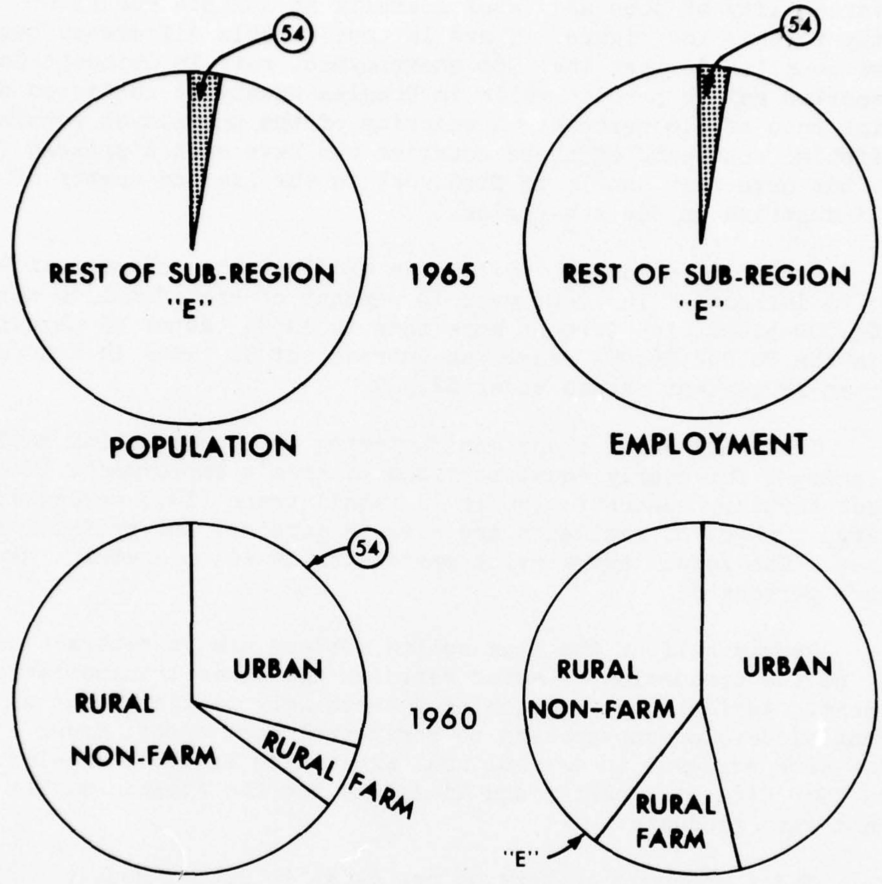

Figure 9-23. Population, Employment and Urban-Rural Population Distribution of State Planning Sub-region 54 Compared to Sub-region E

The high migration rates have been accentuated by employees of Atlanta companies moving into the area. The dominant function of both counties, serving as "bedroom" communities for Atlanta, is reflected in the distribution pattern of the population. Over 65 percent of the sub-region's population in 1960 was classed as rural non-farm, an increase of over 155 percent from 1950. Urban concentrations increased by 72 percent to include 29 percent of area residents. Less than 6 percent of the population was categorized as rural farm. (See Figure 9-23.)

Low unemployment rates, a relatively high distribution of families in the middle-income classes, and a concentration of population in tertiary and sophisticated secondary activities exist in Gwinnett County and to some extent in Douglas County. Unemployment rates for the state planning sub-region, which have not been abnormally high in recent years, have continued to decline; in 1965, only 900 persons, 3.6 percent of the total work force, were not gainfully employed.

The availability of jobs and labor scarcity in Atlanta contribute directly to this low figure. There is considerable difference between the two counties in that the 1966 unemployment rate in Gwinnett County was reported as 2.8 percent while in Douglas County it continued at the high rate of 7.6 percent. A majority of the unemployed population are lifetime residents of these counties who have been displaced from farms, but have been unable to find work in the limited number of low-skill industries in the sub-region.

A concentration of families in middle-income classes is expected to increase. In 1960, over 40 percent of area families earned from $3,000-5,000, 169 percent more than in 1950. About 23 percent were in the $6,000-$9,999 range, an increase of 11 times in ten years. Less than 19 percent earned under $2,000.

Trade and service and manufacturing and construction activities account for nearly equal portions of area's employment. The heaviest tertiary concentration is in retail trade (14.3 percent), but large numbers of residents are also in personal and professional services. The retail and service operations in Atlanta employ many of these persons.

Nearly half of the blue collar workers are in contract construction, and the production of motor vehicles and other transportation equipment. Agriculture is becoming increasingly insignificant as residential development spreads to peripheral farm areas; under 1,000 persons were employed in agricultural activities in 1960, one-fourth of the 1950 figure. Poultry and livestock for the Atlanta market are the dominant farm products.

Major economic centers do not exist in either county. Numerous small residential towns are dispersed throughout the area, particularly in Gwinnett. Although residents are employed in a variety of activities, as noted above, most are employed in Atlanta; only basic services and small labor-oriented industry exist in the sub-region.

The economic future of both counties centers on the ability to provide home sites and related services for the expanding metropolitan area. In addition, as land becomes scarce around the Atlanta fringe, the farm land and open space of Gwinnett and Douglas will be of major economic importance to light industry.

The key to the development of both counties, then, lies in the provision of virgin space for Atlanta's expansion which is readily accessible to both the city core area and the entire Southeast. With these goals in mind, an advanced expressway and rapid transit system is under development. Interstate 85, connecting Atlanta with the Carolina Piedmont, divides Gwinnett; Douglas is bisected by the Atlanta-to-Birmingham Interstate 20. The entire Southeastern Interstate System, of which Atlanta is the geographic center, is readily accessible. Rapid transit, now in the advanced planning stages, will extend from Atlanta to south Gwinnett; future planning may incorporate populated sections of Douglas.

Douglasville. Douglasville (4,462, 1965 estimated population), the largest city of the sub-region, has been designated a growth center. Although Atlanta's dominance precludes the development of a large-scale tertiary function, Douglasville has evolved basic tertitary functions to serve the increasing suburban population; minor industrial development has also occurred. As the Atlanta SMSA expands, however, and developable land in the inner-city becomes scarce, Douglasville is expected to become a site of intensive growth, due to its location adjacent to Interstate 20 and the availability of open space.

The tabulations in Tables 9-12 and 9-13 present the most recent census data for the sub-region.

TABLE 9-12
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
GEORGIA STATE PLANNING SUB-REGION 54

	1950	1960	Absolute Change
TOTAL ALL SECTORS	15,551	21,130	5,579
PRIMARY ACTIVITIES	3,526	1,051	- 2,475
Agriculture	3,505	982	- 2,523
Forestry & Fisheries	3	4	1
Mining	18	65	47
SECONDARY ACTIVITIES	6,310	10,103	3,793
Contract Construction	1,538	2,398	860
Food & Kindred Products	345	695	350
Textile Mill Products	498	634	136
Apparel	373	834	461
Lumber, Wood Products, Furniture	931	750	- 181
Printing & Publishing	82	202	120
Chemicals & Allied Products	47	172	125
Electrical & Other Machinery	125	397	272
Motor Vehicles & Equipment	926	1,385	459
Other Transportation Equipt.	3	293	290
Other & Miscellaneous	1,442	2,343	901
TERTIARY ACTIVITIES	5,477	9,519	4,042
Transportation & Communications	582	1,029	447
Utilities & Sanitary Service	136	248	112
Wholesale Trade	370	748	378
Retail Trade	1,909	3,028	1,119
Finance, Ins. & Real Estate	221	688	467
Personal Services	1,133	1,868	735
Professional Services	636	1,200	564
Recreational Services	52	59	7
Public Administration	426	646	220
Armed Forces	12	5	- 7
NOT REPORTED	238	457	219

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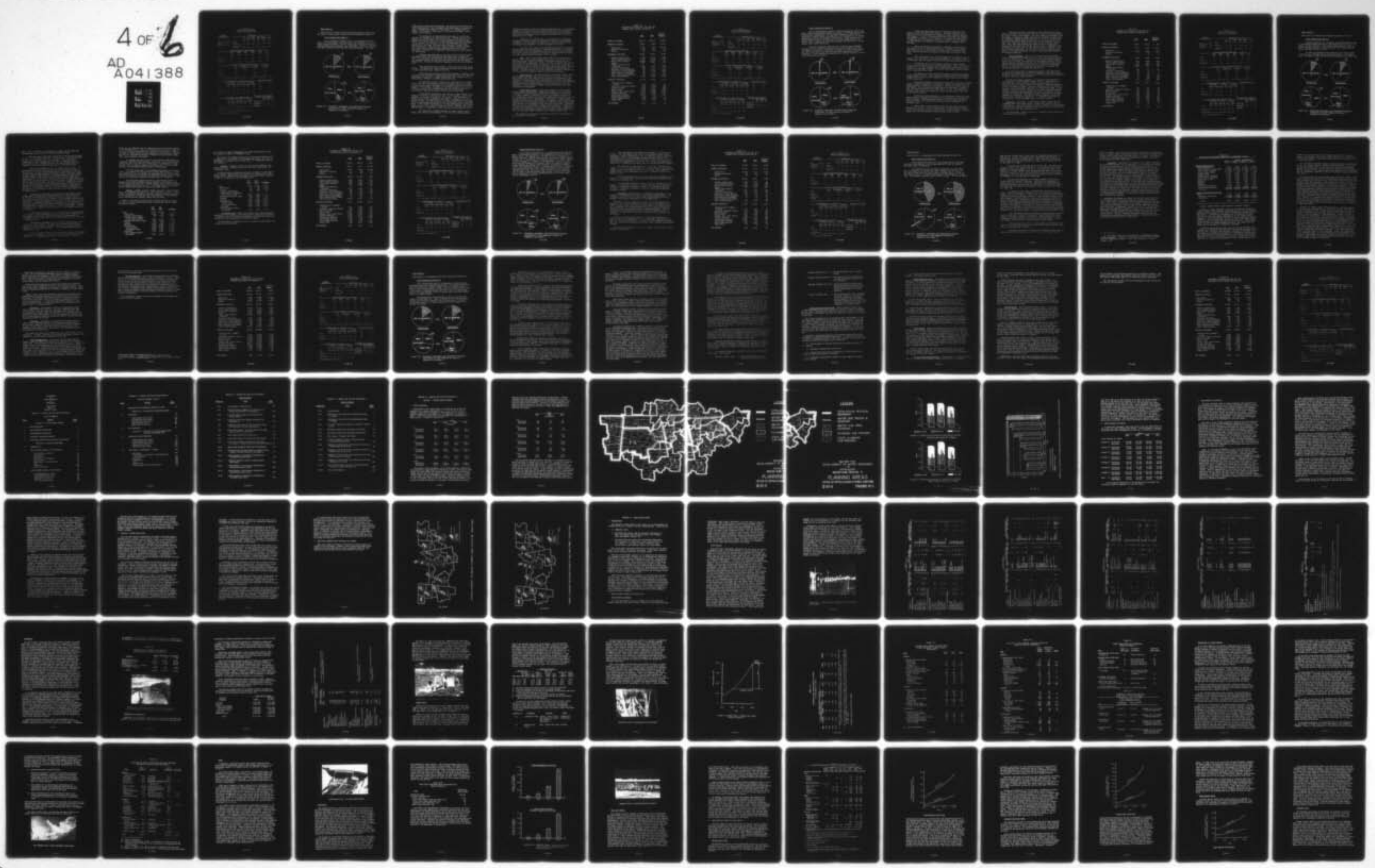

TABLE 9-13
SOCIO-ECONOMIC CHARACTERISTICS
GEORGIA STATE PLANNING SUB-REGION 54
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1966	
Total	78,700
Absolute Change 1960-1966	18,400
Percent Change 1960-1966	30.51

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	60,282	30,124	30,158	3,414	39,394	17,474
Percent Distribution	100.00	49.97	50.03	5.66	65.35	28.99
Percent Change 1950-1960	35.49	35.14	35.83	-81.98	155.69	72.26

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	2,814	1,883	6,083	3,432	876	15,088
Percent Distribution	18.65	12.48	40.32	22.75	5.81	100.00
Percent Change 1950-1960	-49.30	-11.60	169.16	1,148.00	1,652.00	41.54

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	30,042	16,388	11,007	2,025
Percent Distribution	100.00	54.55	36.64	6.74
Percent Change 1950-1960	36.34	12.40	104.40	64.63

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	21,125	986	14,723	585	6,402	400
Percent Distribution	95.54	4.46	96.17	3.83	94.12	5.88
Percent Change 1950-1960	35.95	90.72	22.21	79.20	83.33	110.53

RATE OF UNEMPLOYMENT, 1962-65

1962	4.8
1963	4.5
1964	3.7
1965	3.6

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	22,116	18,065	15,314	4,554	6,802	13,511
Percent Distribution	55.04	44.96	77.08	22.92	33.49	66.51
Percent Change 1950-1960	37.64	23.29	23.67	60.35	84.59	14.38

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	%
Tot. Work Force	24.7	3.5	16.5
Tot. Employment	23.8	3.6	17.8
Unemployment	0.9	-0.1	-10.0

Water Area E-2

Water Area E-2 contains State Planning Sub-regions 51 and 55 and one county, Douglas County, Georgia of State Planning Sub-region 54.

State Planning Sub-region 51

Of all Georgia sub-regions, Area 51 has progressed the farthest in the development cycle and exhibits the potential for a continued large-scale growth. Several urban nodes, necessary centers for advanced industrial development, are established. The area is bisected by a major Interstate route and other improved highways. Two large

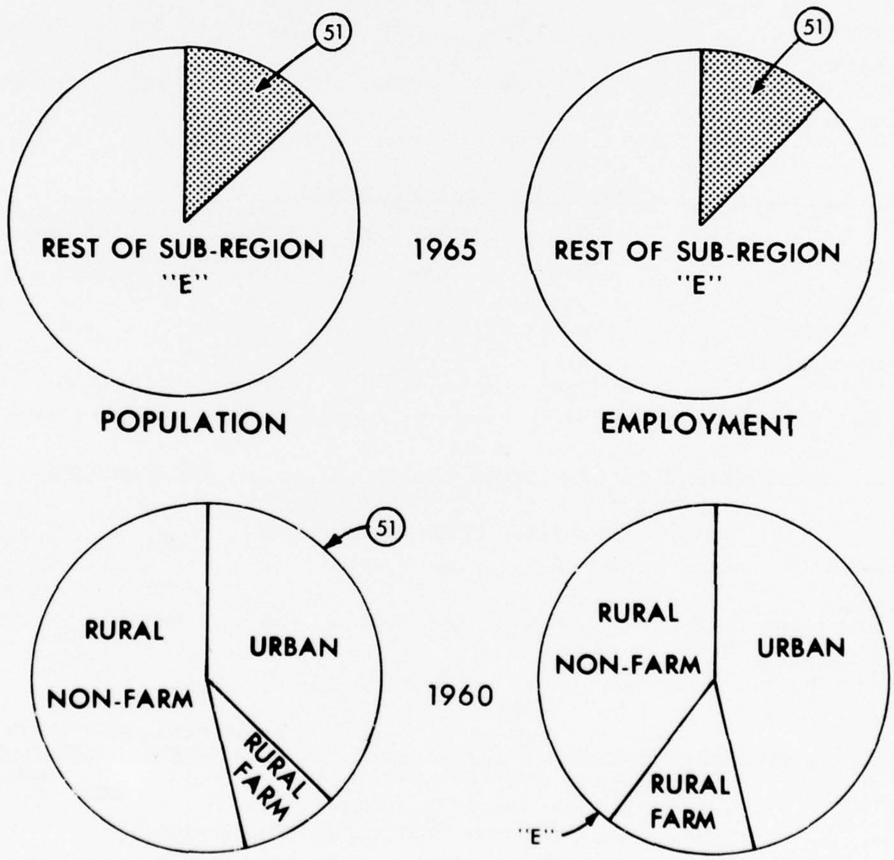

Figure 9-24. Population, Employment, and Urban-Rural Population Distribution of State Planning Sub-region 51, Compared to Sub-region E

urban centers, Atlanta and Chattanooga, are located at the southern and northern boundaries of the sub-region, providing markets for area products. Although three counties of Sub-region 51 - Catoosa, Dade and Walker - are located in Water Area J-4, the entire sub-region is discussed in this section.

The population of State Planning Sub-region 51 in 1960 was 319,000, an increase of 8.9 percent from 1950. Between 1960 and 1965, Whitfield had an increase of 21.6 percent, Bartow, 15.9 percent and Walker, 12.1 percent, while all of the remaining counties had increases of 1.6 percent to 8.7 percent. In 1960, the population was about 54 percent rural non-farm, 19 percent rural farm and 37 percent urban. (See Figure 9-24.) This was a 61.5 percent change in rural non-farm and a 20.8 percent change in urban populations over that in 1950. As of 1960, 55 percent of the population had not gone to school beyond the eighth grade.

Manufacturing employment in the area declined one-half percent in numbers between 1954 and 1958 and then gained over 10 percent by 1963. The value added by manufacture and value added per employee steadily increased between 1954 and 1963 with 60.4 and 45.5 percent change, respectively. This would indicate an upgrading of skills and mechanization.

Total employment grew by nearly 11,000 during the decade of the fifties. The medical and other professional services sector experienced the most significant gain, nearly 3,500 jobs.

Gains were also shown for construction, apparel, chemicals, electrical and other machinery, transportation equipment, food, and other and miscellaneous industries. Losses in employment were recorded for the agricultural, textiles, and lumber products sectors.

The continued decline in agriculture, compounded by the transition to the less labor-intensive livestock industry, has over a period of time released a high percentage of its manpower from the agricultural segment of the economy. Increases in industrial opportunities, such as textiles in Dalton, has provided absorption of this group, and led to an increase in population between 1950 and 1960 in many areas.

The available work force in the area was 113,300 in 1965, an increase of 7,400 or 7.0 percent over 1962. Of this number, 108,000 were employed, an increase of 10,800 or 11.1 percent. This resulted in a steady decline in the unemployment rate from 8.2 percent in 1962 to 4.7 percent in 1965. The labor force of the area can generally be described as low to medium skilled, reflecting the low education levels, described above. Labor reserve limitations in the less industrialized counties may limit the size of the industries that will locate. However, with a substantial amount of commuting, a large potential reserve manpower exists.

The high number of female employees in some counties, particularly those having a concentration of the textile and wearing-apparel

industries, reflects a need for industries employing men. It is possible, however, that resistance to such new industries might exist because of the fear on the part of existing firms of losing some of their female labor force when some previously unemployed husbands should become employed by the new firms.

Interstate 75 traverses Area 51 from Atlanta to Chattanooga. Interstate 20 between Atlanta and Birmingham cuts across the southern extremity of the sub-region. In addition, a network of federal, state and county roads supplement the major corridors in the area.

The Coosa River, part of the Alabama-Coosa System, is the major waterway which has the potential of being made navigable. The Alabama River, which flows from Montgomery to Mobile, will be navigable by 1971 and studies are being conducted to assess the economic impact of making the Coosa navigable from Montogmery to Rome, Georgia.

Rome. Rome is the largest urban center in the planning sub-region, with a 1965 estimated population of 31,500, and is one of the four major growth centers in Georgia. Manufacturing accounted for about 40 percent of employment in 1965. Of this, 43 percent was textile and apparel; 15 percent metals and machinery; 14 percent, chemicals, and 10 percent pulp and paper. A regionally significant service function has been developed, but is limited by a proximity to Chattanooga and Atlanta. Although located out of the Interstate corridors, adequate access is provided by improved federal and state road networks.

Dalton-Calhoun. The Dalton-Calhoun area through Gordon, Murray and Whitfield Counties, along the Interstate 75 corridor, is a second major growth area, with ready access to Atlanta and Chattanooga. Employment is increasingly becoming concentrated in textiles and apparel, especially in tufted carpets and textile-linked activities, with machinery manufacturing and printing evolving. Poultry processing is also of importance. Total employment increases continue, despite high losses in agricultural employment.

Minor Growth Centers. Other towns denoted as growth centers include Bremen, Cartersville, Cedartown and Summerville in Sub-region E and Fort Oglethorpe-Ringgold, LaFayette and Rossville in Sub-region J. Bremen, located on Interstate 20 should be favorably affected as the Atlanta area expands along the major transportation corridor, but has as yet experienced little development. Cartersville, between Atlanta and Rome, has developed a minor base in non-durable industries and should similarly benefit from Atlanta's growth. Cedartown is more isolated than other centers, being somewhat distant from area expressways; development has been limited to non-durable consumer goods industries. Summerville is similar to Cedartown in both situation and development. Rossville and the Fort Oglethorpe-Ringgold areas are minor textile centers associated with the Chattanooga SMSA; LaFayette has a similar economic base.

The tabulations in Tables 9-14 and 9-15 present the most recent census data for the sub-region.

TABLE 9-14
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
GEORGIA STATE PLANNING SUB-REGION 51

	1950	1960	Absolute Change
TOTAL ALL SECTORS	105,815	116,644	10,829
PRIMARY ACTIVITIES	18,900	7,808	-11,092
Agriculture	18,193	7,230	-10,963
Forestry & Fisheries	86	105	19
Mining	621	473	- 148
SECONDARY ACTIVITIES	49,581	59,870	10,289
Contract Construction	5,234	7,056	1,822
Food & Kindred Products	1,215	2,556	1,337
Textile Mill Products	27,068	26,299	- 769
Apparel	5,677	7,047	1,370
Lumber, Wood Products, Furniture	4,893	3,227	- 1,666
Printing & Publishing	562	971	409
Chemicals & Allied Products	792	2,251	1,459
Electrical & Other Machinery	710	2,516	1,806
Motor Vehicles & Equipment	180	411	231
Other Transportation Equipt.	54	1,262	1,208
Other & Miscellaneous	3,196	6,278	3,082
TERTIARY ACTIVITIES	35,779	47,230	11,451
Transportation & Communications	3,419	3,563	144
Utilities & Sanitary Service	995	1,658	663
Wholesale Trade	1,568	2,375	807
Retail Trade	11,920	14,820	2,900
Finance, Ins. & Real Estate	1,512	2,780	1,268
Personal Services	8,077	9,578	1,501
Professional Services	5,654	9,176	3,522
Recreational Services	523	518	- 5
Public Administration	2,002	2,557	555
Armed Forces	109	205	96
NOT REPORTED	1,555	1,736	181

TABLE 9-15
SOCIO-ECONOMIC CHARACTERISTICS
GEORGIA STATE PLANNING SUB-REGION 51
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1966	
Total	353,700
Absolute Change 1960-1966	33,900
Percent Change 1960-1966	10.60

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	319,825	156,230	163,595	29,672	172,731	117,422
Percent Distribution	100.00	48.85	51.15	9.28	54.01	36.71
Percent Change 1950-1960	8.93	8.54	9.31	-66.83	61.55	20.78

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	15,582	10,941	32,637	17,400	4,816	81,376
Percent Distribution	19.15	13.44	40.11	21.38	5.92	100.00
Percent Change 1950-1960	-53.28	-31.51	93.18	701.84	533.68	13.84

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	107,860	93,092	57,189	13,250
Percent Distribution	100.00	55.46	34.07	7.89
Percent Change 1950-1960	52.48	-2.53	54.88	36.81

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	116,439	6,277	77,726	3,494	38,713	2,783
Percent Distribution	94.88	5.12	95.70	4.30	93.29	6.71
Percent Change 1950-1960	10.15	20.16	3.93	7.91	25.20	20.16

RATE OF UNEMPLOYMENT, 1962-65	
1962	8.2
1963	6.8
1964	5.6
1965	4.7

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	122,921	98,669	81,421	24,943	41,500	73,726
Percent Distribution	55.47	44.53	76.55	23.45	36.02	63.98
Percent Change 1950-1960	10.70	6.37	4.22	22.50	26.07	1.84

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	113.3	7.4	7.0
Tot. Employment	108.0	10.8	11.1
Unemployment	5.3	-3.4	-39.1

State Planning Sub-region 55

The two southernmost counties of Georgia Appalachia, Carroll and Heard, comprise Appalachian Planning Sub-region 55. Although fairly underdeveloped and underpopulated, the sub-region possesses a potential for significant economic growth, due primarily to its proximity to the Atlanta metropolitan area and its abundant land resource. Being located near the major economic center of the South has had certain drawbacks also, as Atlanta tends to depopulate fringe area counties and this tends to reduce certain local service functions.

Although substantial growth has not occurred, some development has taken place in unskilled industrial activities, primarily textiles and apparel. Agriculture, especially row crops, once the leading employment and income sector, has declined drastically and today is minor in importance. Recent agricultural expansion has occurred, however, in livestock and poultry activities.

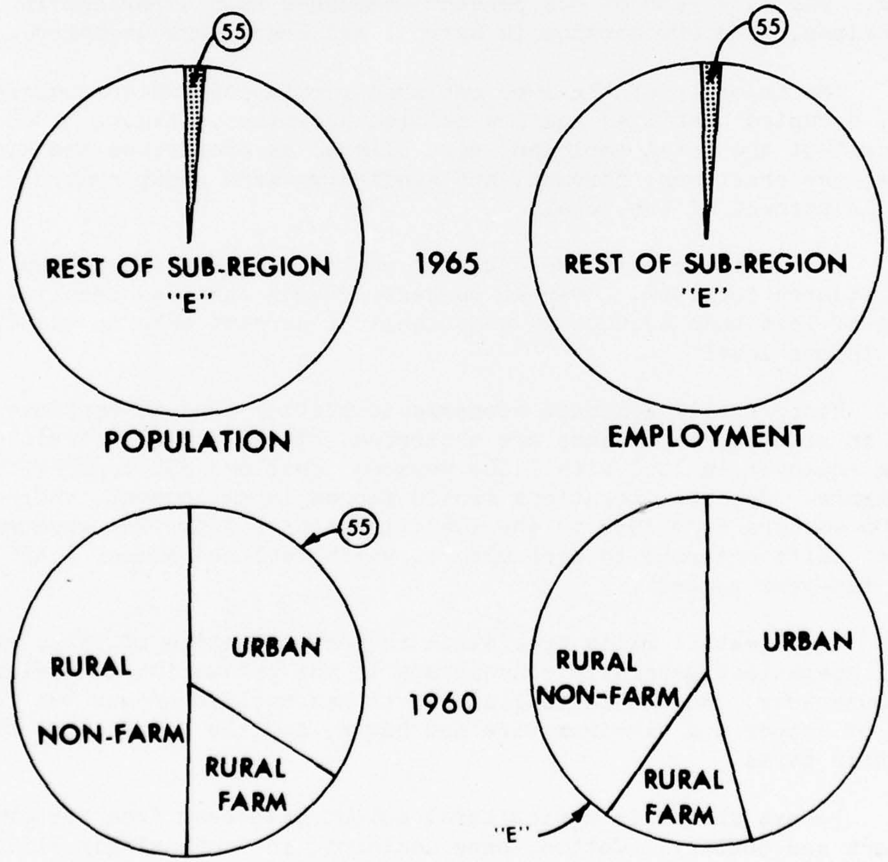

Figure 9-25. Population, Employment and Urban-Rural Population Distribution of State Planning Sub-region 55 Compared to Sub-region E

Unlike many Appalachian areas, a relatively rapid population growth is characteristic of this section. The 1966 population, estimated to be 45,100, represents an increase of almost 8 percent from the 1960 figure of 41,784; in the period 1950-1960, when rural out-migration was dominant in Georgia, a net increase of 1.7 percent was registered. A relatively high net migration loss from 1950-1960 of over 15 percent has been reversed; 18.7 percent in-migration rate is estimated from 1960-1965.

Rural farm population continues to decrease in both absolute and relative terms; in 1960, slightly under 16 percent of the regional population could be so classified, a decline of over 68 percent from 1950. Significant growth is apparent in both rural non-farm and urban areas.

High unemployment rates, although common to this section, are declining. The 1962 rate of 9.1 percent decreased to 5.4 percent in 1965, nevertheless, some 800 persons in Carroll and Heard were unemployed in 1965.

The majority of the 1960 employed population, which numbered 16,969, occupied unskilled and low-skilled positions. Almost 6,000 persons, 35 percent of the total employed, were classed as operatives and kindred workers; the craftsmen, foremen, and kindred workers group numbered nearly 2,000, 12 percent of the total.

The dominance of lower skilled employment is reflected by family income figures for 1960. Over 40 percent of area families received annual incomes of less than $3,000; an additional 36 percent were in the $3,000-$5,999 income level.

Historically dominant economic activities tend to continue, although shifts in relative importance are occurring. Textile mill activities, the leading employer in 1960 with 1,800 persons, declined 350 workers from the 1950 figure. Apparel operations ranked second in employment, increasing over 700 workers from 1950 to the 1960 figure of 1,775. The greatest employment shift occurred in agriculture, which declined almost 3,400 jobs in the ten-year period.

Area textile mills specialize in the production of yarns and cords. Apparel operations generally concentrate in the production of hosiery and men's outerwear. Recent industrial growth has evolved around the fabricating of copper and aluminum wire and cable, and the manufacture of automobile parts.

Recent shifts in agricultural output have been from row crops to livestock and poultry. Cotton, once dominant, is increasingly declining. Poultry now accounts for over one-half of farm income in Carroll; livestock sales total over three-fourths of agricultural income in Heard.

This area can only be understood in the context of the metropolitan development in the Atlanta area and the rapid decline of farming as a way of life in north Georgia. The small farms of the Piedmont have been bought up rapidly by lumber companies and replanted to forests and by industrial organizations desiring sites in or near the Atlanta SMSA. The traditional family farms of this area were not large and in recent years have usually not provided an adequate economic base for family life. Thus, many farm families have crowded into the fringe of the metropolitan area where they can get unskilled work to supplement some subsistence from small plots of land owned or leased. Housing is very poor in these fringe areas. As the area becomes industrialized, there should be a gradual improvement in living, as the young take advantage of vocational training.

Carrollton-Bremen. The town of Carrollton and the corridor along U.S. Highway 27 to Bremen is a major center of economic importance in the two-county district. Carrollton, with a 1964 estimated population of 11,400, serves as the service and employment focus for Carroll, Coweta, Haralson, and Heard Counties, and the employment center for the majority of the sub-region's trade and services sector of employment. Due to the proximity of Atlanta, specialized retail, wholesale, and service functions have not developed extensively.

In the Carrollton area, the general spectrum of urban facilities and services is available for industrial expansion. The rural section of Carroll and most of Heard County require the installation or upgrading of water, sewer, and other facilities.

Of potential economic importance to Carroll and Heard Counties is the completion of the Interstate highway network. Interstate 20, a major east-west route connecting Atlanta and Birmingham, bisects of northern portion of Carroll County, Interstate 85, Atlanta to Montgomery, is to the southeast of Heard. As space requirement for the continued growth of Atlanta increases, large tracts of developable areas of these counties, within one hour of Atlanta by Interstate, may prove valuable for both industrial and agricultural activities. For growth to reach interior portions of the sub-region, however, improvement of secondary roadways is a necessity. The corridor between Carrollton and Bremen, which will be bisected by Interstate 20 is envisioned as an area for future growth; little development has yet occurred, however.

Villa Rica. Villa Rica, in northeastern Carroll County, has been designated as a minor growth center, although this potential has yet to be realized. As in other areas, the major criteria for judging growth potential are a location on an Interstate Highway (Route 20), a proximity to the Atlanta SMSA, and undeveloped land.

The tabulations in Tables 9-16 and 9-17 present the most recent census data for the sub-region.

TABLE 9-16
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
GEORGIA STATE PLANNING SUB-REGION 55

	1950	1960	Absolute Change
TOTAL ALL SECTORS	15,491	15,173	- 318
PRIMARY ACTIVITIES	4,773	1,398	- 3,375
Agriculture	4,761	1,370	- 3,391
Forestry & Fisheries	8	20	16
Mining	4	8	4
SECONDARY ACTIVITIES	5,626	7,459	1,833
Contract Construction	872	1,280	408
Food & Kindred Products	145	361	216
Textile Mill Products	2,176	1,822	- 401
Apparel	1,060	1,775	715
Lumber, Wood Products, Furniture	978	522	- 456
Printing & Publishing	46	29	- 17
Chemicals & Allied Products	55	52	- 3
Electrical & Other Machinery	17	99	82
Motor Vehicles & Equipment	24	164	140
Other Transportation Equipt.	4	174	170
Other & Miscellaneous	249	1,181	932
TERTIARY ACTIVITIES	4,911	6,013	1,102
Transportation & Communications	434	562	128
Utilities & Sanitary Service	150	211	61
Wholesale Trade	225	271	46
Retail Trade	1,509	1,497	- 12
Finance, Ins. & Real Estate	160	238	78
Personal Services	1,272	1,574	302
Professional Services	773	1,199	426
Recreational Services	109	41	- 68
Public Administration	266	403	137
Armed Forces	13	17	4
NOT REPORTED	181	303	122

TABLE 9-17
SOCIO-ECONOMIC CHARACTERISTICS
GEORGIA STATE PLANNING SUB-REGION 55
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1966	
Total	45,100
Absolute Change 1960-1966	3,300
Percent Change 1960-1966	7.89

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	41,784	20,387	21,397	6,681	20,829	14,274
Percent Distribution	100.00	48.79	51.21	15.99	49.85	34.16
Percent Change 1950-1960	1.70	0.48	2.88	-68.57	72.54	84.11

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	2,711	1,647	3,840	1,903	503	10,604
Percent Distribution	25.57	15.23	36.21	17.95	4.74	100.00
Percent Change 1950-1960	-58.07	-2.54	163.92	1,053.33	738.33	5.41

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	21,920	12,196	7,415	1,785
Percent Distribution	100.00	55.64	33.83	8.14
Percent Change 1950-1960	4.38	-8.13	35.19	38.37

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	15,156	710	9,677	453	5,479	257
Percent Distribution	95.53	4.47	95.53	4.47	95.52	4.48
Percent Change 1950-1960	-2.08	42.86	-11.92	72.24	21.97	9.83

RATE OF UNEMPLOYMENT, 1962-65

1962	9.1
1963	7.6
1964	7.2
1965	5.4

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	15,883	13,310	10,147	3,943	5,736	9,367
Percent Distribution	54.41	45.59	72.02	27.98	37.98	62.02
Percent Change 1950-1960	-0.66	6.30	-9.87	48.29	21.27	-5.02

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	15.6	0.8	5.4
Tot. Employment	14.8	1.4	10.4
Unemployment	0.8	-0.6	-42.9

Water Area E-3

Water Area E-3 contains State Planning Sub-regions 57 and 58.

State Planning Sub-region 57

Planning Sub-region 57, centered on the Gadsden-Anniston area in northeastern Alabama, recorded a 1960 population of 261,500, a 5.4 percent increase from 1950. Out-migration from 1960-1965 offset the natural increase, however, and the population total remains fairly static (estimated 262,100 in 1965).

In 1960, the population was classified as 49 percent urban, 37 percent rural non-farm, and 14 percent rural farm. (See Figure 9-26). Increase in rural non-farm and urban populations occurred from

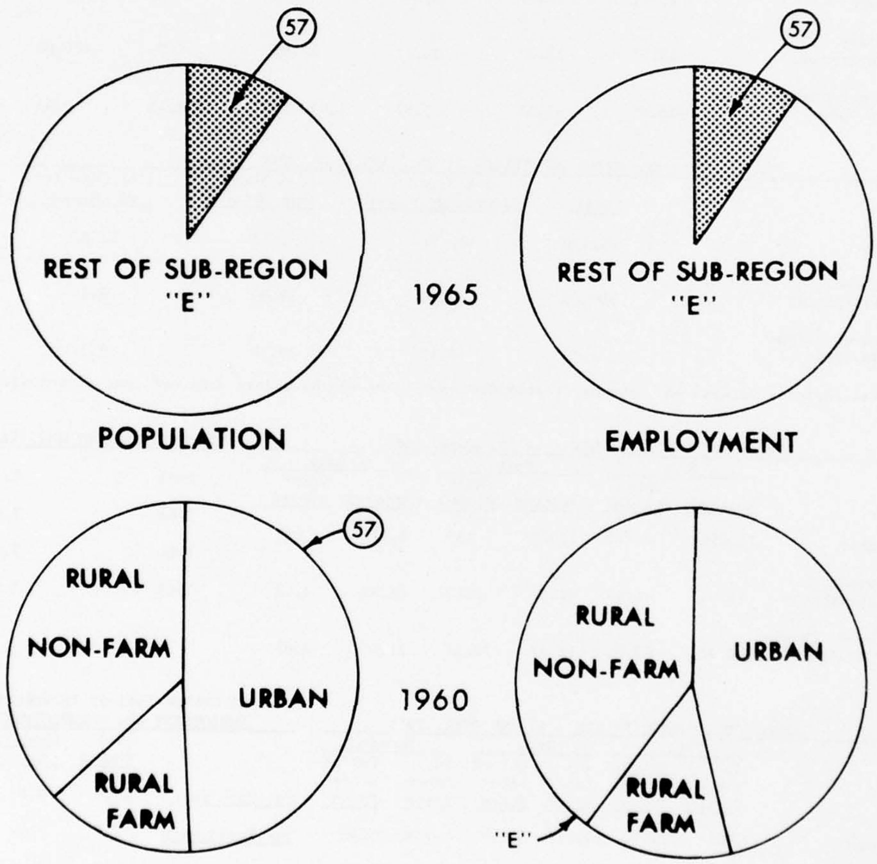

Figure 9-26. Population, Employment, and Urban-Rural Population Distribution of State Planning Sub-region 57 Compared to Sub-region E

1950. About 40 percent of the population 25 years old and older has attended high school and about 9 percent attended college.

The work force in the area numbered 87,400 in 1965, an increase of 2,700, or 3.2 percent from 1962. Of this total, 83,100 were employed in 1965, an increase of 5,300, or 6.8 percent. This resulted in a steady decline in the unemployment rate from 8.2 percent in 1962 to 4.9 percent in 1965. The labor force of the area can generally be described as low skilled, which derives from low educational levels.

Employment grew modestly by 3,000 between 1950 and 1960. The major gains were in the services trade and construction activities. The continuing decline in row-crop agriculture, compounded by the transition to the less labor-intensive livestock industry, has over a period of time released a high proportion of available manpower from the agricultural segment of the economy. The failure to provide industrial opportunities in the more rural counties, sufficient to employ these displaced from agriculture, has led to a severe decline in population between 1950 and 1960 in these areas. In most of the rural counties, the decline has now bottomed out and the area population appears to have stabilized; some have even exhibited a slight-to-moderate increase in population in the 1960's. This appears to be due to a slowing down or ending of the readjustment in agriculture and some increase in industrial opportunities in these counties.

In addition to high rates of unemployment (especially in rural areas), there is substantial underemployment in the form of tendencies to continue to farm on a small scale even though the labor involved could be used more productively elsewhere, given employment opportunities. Many families of this area farm on a small scale and also supply industry with labor. Substantial increases in productivity could be attained if sufficient amounts of industry could be attracted into the area to induce these families to abandon agriculture for industrial employment. However, a drawback to this solution is a high number of older farmers who may not be trainable.

Labor supply limitations in the less industrialized counties may limit the size of the industries that will locate there. However, potential manpower exists with a substantial amount of commuting and the willingness of many individuals to change employment in order to be closer to their residence.

Manufacturing employment in the sub-region declined from 27,000 in 1954, to 21,800 by 1963. The value added by manufacture and value added per employee, however, steadily increased 15.8 and 32.7 percent respectively during this time period. This indicates mechanization and higher skilled jobs.

The major natural resources are timber, coal, iron ore, limestone, clay, and sand and gravel. Due to the costs of mining, much of the coal deposits are not commercially exploitable at this time. In addition,

nearly all the remaining iron ore deposits have little economic potential in the immediate future. This is in evidence from the fact that much of the iron ore used in producing steel products is now imported. There is a surplus of timberland in the area, potentially a good natural resource base for the continued development of forestry and wood products industries (wood, newsprint, pulp paper).

In Alabama, the focal point of the Interstate Highway System is Birmingham, from which major corridors branch out. The Interstate roads located in Area 57 are I-20 which travels east from Birmingham through Anniston and will later be completed to Atlanta, and I-59 which trends northeast from Birmingham through Gadsden to Chattanooga.

The Coosa River, part of the Alabama-Coosa System, is the major river in the area and has the potential of being made navigable. By 1971 the Alabama River will be navigable to Montgomery and this report recommends that navigation be extended from Montgomery through Gadsden to Rome, Georgia (See Coosa River Navigation Project, Part III, Chapter 9).

The sub-region contains portions of three growth centers. A primary area focused on Gadsden extends northwest into Marshall County (State Planning Sub-region 56). Another primary center, Anniston, extends into Talladega County (Sub-region 59). A secondary center is delimited between Gadsden and Anniston in Calhoun and Etowah Counties.

Gadsden. Gadsden, situated between Interstate 59 and the Coosa River, is the largest sub-region city (1960 population, 58,090). A basic industry orientation includes a steel mill, pipe and foundry operations, and the manufacture of tires and other rubber products. Textile activities, utilizing mostly low-skill labor, are also found.

Trends for the whole of Etowah County indicate substantial employment gains in durable manufactured goods, construction, and the trades and services sectors:

	1960 (Mar)	1966 (Mar)	% Change
Total	28,800	30,450	+ 5.7
Agriculture	1,120	830	- 25.9
Contract construction	760	1,490	+ 96.1
Transportation, communication and utilities	1,750	1,230	- 29.7
Wholesale and retail trade	4,150	4,490	+ 8.2
Finance	810	790	- 2.5
Services	2,640	3,320	+ 25.8
Manufacturing	9,780	10,500	+ 7.4
Durable goods	5,420	6,500	+ 19.9
Non-durable goods	4,360	4,000	- 8.3
Government	2,770	3,300	+ 19.1
Other non-agricultural employment	5,020	4,500	- 10.4

On a county-wide basis, unemployment rates have been declining, from 14.7 percent in 1960 to 5.3 percent in 1966.

The prospect for Gadsden to grow into a metropolitan service center is modest due to its proximity to Birmingham and Atlanta, but with the development of navigation on the Cossa River, its industrial future is much brighter.

Anniston. Anniston (33,660) is similarly an industrial city, producing textiles, chemicals, pipe fittings, metal fabricating, and electronics tubes.

In Calhoun County, substantial employment increases in both durable and non-durable manufacturing activities and the tertiary sector have offset losses in agriculture, and reduced unemployment from 5.6 percent in 1960 to 3.2 percent in 1966, as shown below:

	1960 (Mar)	1966 (Mar)	% Change
Total	30,580	36,190	+ 18.3
Agriculture	710	540	- 23.0
Mining	120	130	+ 8.3
Contract construction	780	780	0.0
Transportation, communication and utilities	1,110	1,200	+ 8.1
Wholesale and retail trade	4,120	4,370	+ 6.1
Finance	730	720	- 1.4
Services	1,950	2,720	+ 39.5
Manufacturing	8,380	11,180	+ 33.4
Durable goods	3,430	5,180	+ 51.0
Non-durable goods	4,940	6,000	+ 21.4
Government	7,400	9,580	+ 29.4
Other non-agricultural employment	5,280	4,970	- 6.9

Intermediate Area. That section between the cities of Gadsden and Anniston not included in the primary growth areas has been delimited a secondary center, reflecting the prospects for growth from each major center due to the availability of developable lands.

The tabulations in Tables 9-18 and 9-19 present the most recent census data for the sub-region.

TABLE 9-18
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
ALABAMA STATE PLANNING SUB-REGION 57

	1950	1960	Absolute Change
TOTAL ALL SECTORS	83,450	86,655	3,205
PRIMARY ACTIVITIES	18,153	7,617	-10,536
Agriculture	17,851	7,393	-10,458
Forestry & Fisheries	47	88	41
Mining	255	136	- 119
SECONDARY ACTIVITIES	32,099	33,183	1,084
Contract Construction	3,826	5,602	1,776
Food & Kindred Products	827	1,565	738
Textile Mill Products	9,079	6,022	- 3,057
Apparel	593	1,087	494
Lumber, Wood Products, Furniture	2,721	2,301	- 420
Printing & Publishing	413	619	206
Chemicals & Allied Products	393	365	- 28
Electrical & Other Machinery	857	1,761	904
Motor Vehicles & Equipment	21	20	- 1
Other Transportation Equipt.	11	134	123
Other & Miscellaneous	13,358	13,707	349
TERTIARY ACTIVITIES	32,137	44,280	12,143
Transportation & Communications	2,713	3,060	347
Utilities & Sanitary Service	930	1,157	227
Wholesale Trade	1,201	1,578	377
Retail Trade	10,001	11,744	1,743
Finance, Ins. & Real Estate	1,466	1,990	524
Personal Services	6,420	7,776	1,356
Professional Services	4,578	7,315	2,737
Recreational Services	428	428	0
Public Administration	3,742	5,509	1,767
Armed Forces	658	3,723	3,065
NOT REPORTED	1,061	1,575	514

TABLE 9-19
SOCIO-ECONOMIC CHARACTERISTICS
ALABAMA STATE PLANNING SUB-REGION 57
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1965	
Total	262,100
Absolute Change 1960-1965	600
Percent Change 1960-1965	0.23

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	261,487	127,718	133,769	36,362	95,911	129,214
Percent Distribution	100.00	48.84	51.16	13.91	36.68	49.41
Percent Change 1950-1960	5.43	4.09	6.74	-53.24	67.59	14.32

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	16,486	8,250	24,322	13,437	3,774	66,269
Percent Distribution	24.88	12.45	36.70	20.28	5.69	100.00
Percent Change 1950-1960	-43.90	-33.87	69.37	517.79	513.66	8.66

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	136,633	66,426	53,950	12,810
Percent Distribution	100.00	48.62	39.49	9.38
Percent Change 1950-1960	9.28	-9.29	46.54	49.21

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	82,932	6,338	58,187	4,245	24,745	2,093
Percent Distribution	92.90	7.10	93.20	6.80	92.20	7.80
Percent Change 1950-1960	0.22	80.36	-8.17	66.21	27.65	118.02

RATE OF UNEMPLOYMENT, 1962-65

1962	8.2
1963	7.8
1964	5.9
1965	4.9

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	92,993	87,884	64,932	21,849	28,061	66,035
Percent Distribution	51.41	48.59	74.82	25.18	29.82	70.18
Percent Change 1950-1960	6.98	3.41	-2.45	25.17	37.84	-2.22

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	87.4	2.7	3.2
Tot. Employment	83.1	5.3	6.8
Unemployment	4.3	-2.6	-37.7

State Planning Sub-region 58

State Planning Sub-region 58, in southeastern Appalachian Alabama, is economically centered on the Montgomery Metropolitan Area in Elmore County. The population of 1960 was 146,000, a decrease of 5.5 percent from 1950. Between 1960 and 1965, an estimated natural rate of increase of 5.5 percent and a net migration rate of 3.1 percent resulted in a net increase of 2.4 percent, or a population of 149,500 in 1965. Elmore had an increase of 10.7 percent, while the remaining counties, except Chambers and Randolph which declined, had moderate increases. In 1960, the population was about 54 percent rural non-farm, 14 percent rural farm and 32 percent urban; rural non-farm and urban population increased from 1950. As of 1960, about 7 percent of the population over 25 years of age had attended some college, 38 percent some high school training and 51 percent elementary school; all figures represent an improvement from 1950.

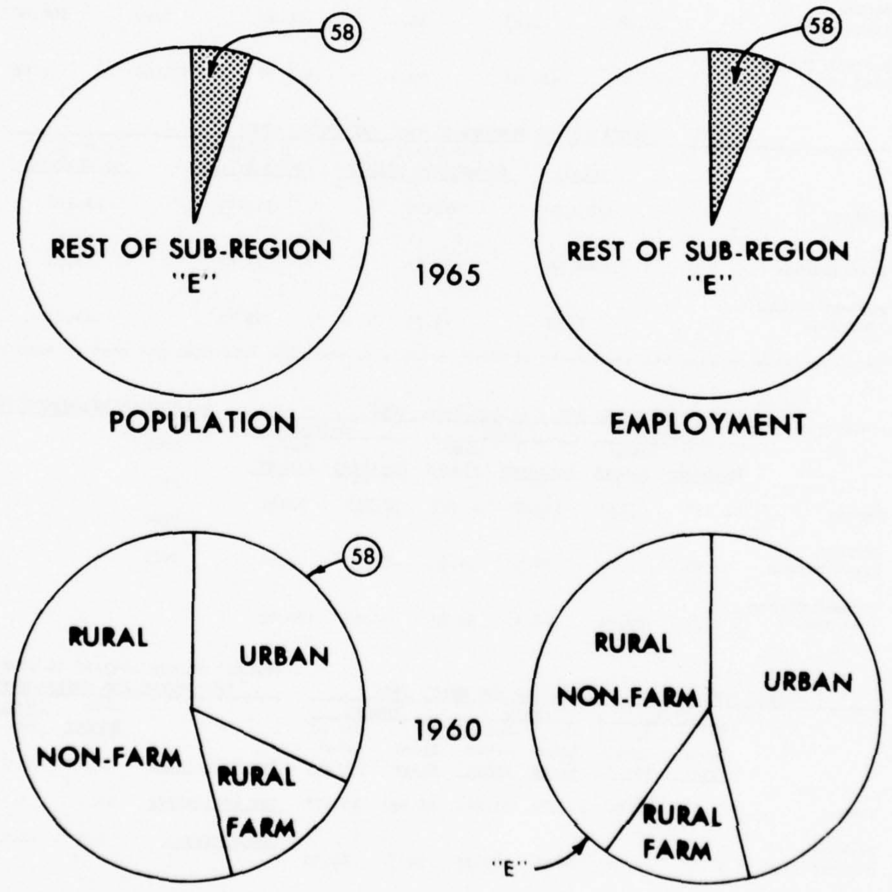

Figure 9-27. Population, Employment, and Urban-Rural Population Distribution of State Planning Sub-region 58 Compared to Sub-region E

Total employment in Sub-region 58 decreased by 2,500 during the fifties. This was primarily due to the large decrease in agricultural employment. Apparel manufacturing, and the trade and services activities accounted for most of the increased employment between 1950 and 1960. Total manufacturing employment declined from 18,943 in 1954 to 18,553 in 1958 and then increased back to 19,005 by 1963. During this same period, value added by manufacture and value added per employee increased steadily.

The work force in the area was 56,600 in 1965. This was an increase of 1,700, or 3.5 percent over 1962. Of this number, 54,500 were employed in 1965, an increase of 2,500, or 4.8 percent. This resulted in a steady decline in the unemployment rate from 5.4 percent in 1962 to 3.6 percent in 1965.

The basic industries in the area are textiles, and lumber and wood products. Only Elmore County had one manufacturing plant employing over 250 in 1960, a textile mill.

The area transporrtation networks are not so extensive as in Sub-region 57. Interstate Highway 65 is located just west of the sub-region between Birmingham and Montgomery. Several U. S. highways go through the area. In addition, a network of state and county roads supplement the major corridors.

Montgomery - Elmore County. Non-Appalachian Montgomery, on the boundary of Sub-region 58, is designated an area of primary growth. The contiguous central section of Elmore County in Appalachia, which is an economic fringe area of Montgomery, is a secondary center.

Montgomery, the state capital and service center for southern Alabama, also has a minor manufacturing function with major emphasis on non-durable consumer goods, especially textiles, apparel, and food products. As in Montgomery, the largest employment sector in Elmore is wholesale and retail trade, with manufacturing of secondary importance. The continued growth of Montgomery as a service and administrative center is projected. Elmore County is expected to share directly or indirectly in this growth.

Potential for significant industrial growth exists throughout the area, because of the abundance of open and developable land and an available, but low-skilled labor force. Completion of the Alabama River Waterway, which would flow through western Elmore County, could be a significant stimulus.

The tabulations in Tables 9-20 and 9-21 present the most recent census data for the sub-region.

TABLE 9-20
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
ALABAMA STATE PLANNING SUB-REGION 58

	1950	1960	Absolute Change
TOTAL ALL SECTORS	56,524	54,022	- 2,502
PRIMARY ACTIVITIES	14,777	5,343	- 9,434
Agriculture	14,618	5,119	- 9,499
Forestry & Fisheries	69	123	54
Mining	90	101	11
SECONDARY ACTIVITIES	23,662	26,651	2,989
Contract Construction	2,668	3,026	358
Food & Kindred Products	347	945	598
Textile Mill Products	15,462	15,728	266
Apparel	530	2,221	1,691
Lumber, Wood Products, Furniture	3,615	2,737	- 878
Printing & Publishing	182	247	65
Chemicals & Allied Products	132	117	- 15
Electrical & Other Machinery	81	294	213
Motor Vehicles & Equipment	8	35	27
Other Transportation Equipt.	4	74	70
Other & Miscellaneous	633	1,227	594
TERTIARY ACTIVITIES	17,266	21,002	3,736
Transportation & Communications	1,132	1,052	- 80
Utilities & Sanitary Service	444	646	202
Wholesale Trade	617	786	169
Retail Trade	5,021	5,746	725
Finance, Ins. & Real Estate	468	791	323
Personal Services	5,467	6,463	996
Professional Services	2,677	3,481	804
Recreational Services	202	155	- 47
Public Administration	1,181	1,802	621
Armed Forces	57	80	33
NOT REPORTED	819	1,026	207

TABLE 9-21
SOCIO-ECONOMIC CHARACTERISTICS
ALABAMA STATE PLANNING SUB-REGION 58
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1965	
Total	149,500
Absolute Change 1960-1965	3,500
Percent Change 1960-1965	2.40

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	145,962	71,185	74,777	20,686	79,388	45,888
Percent Distribution	100.00	48.77	51.23	14.17	54.39	31.44
Percent Change 1950-1960	-5.50	-6.81	-4.22	-69.20	54.76	27.47

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	10,706	5,500	12,465	6,232	1,504	36,407
Percent Distribution	29.41	15.11	34.24	17.12	4.13	100.00
Percent Change 1950-1960	-46.63	-22.75	63.91	526.33	478.46	-1.70

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	78,136	39,873	29,555	5,799
Percent Distribution	100.00	51.03	37.83	7.42
Percent Change 1950-1960	-1.07	-13.24	29.03	26.34

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unem-ployed	Employed	Unem-ployed	Employed	Unem-ployed
Number	53,942	2,287	34,022	1,222	19,920	1,065
Percent Distribution	95.93	4.07	96.53	3.47	94.92	5.08
Percent Change 1950-1960	-4.47	42.76	-15.95	27.56	24.57	65.37

RATE OF UNEMPLOYMENT, 1962-65

1962	5.4
1963	4.8
1964	4.2
1965	3.6

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	56,309	45,405	35,324	13,400	20,985	32,005
Percent Distribution	55.36	44.64	72.50	27.50	39.60	60.40
Percent Change 1950-1960	-3.13	-8.00	-14.85	20.36	26.11	-16.26

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	56.6	1.7	3.1
Tot. Employment	54.5	2.5	4.8
Unemployment	1.1	-1.8	-62.1

Water Area E-4

Water Area E-4 is coterminous with State Planning Sub-region 59.

State Planning Sub-region 59

State Planning Sub-region 59 is the largest region, both demographically and areally, in the Alabama portion of Water Sub-region E. The major center is Birmingham.

The population of the sub-region in 1960 was 1,121,200, which was an increase of 5.2 percent over 1950. Between 1960 and 1965, it has been estimated that the natural rate of increase was 6.1 percent; a net migration loss of 2.5 percent resulted in a net increase of 3.6 percent. The estimated population was 1,161,900 in 1965. Chilton and Pickens

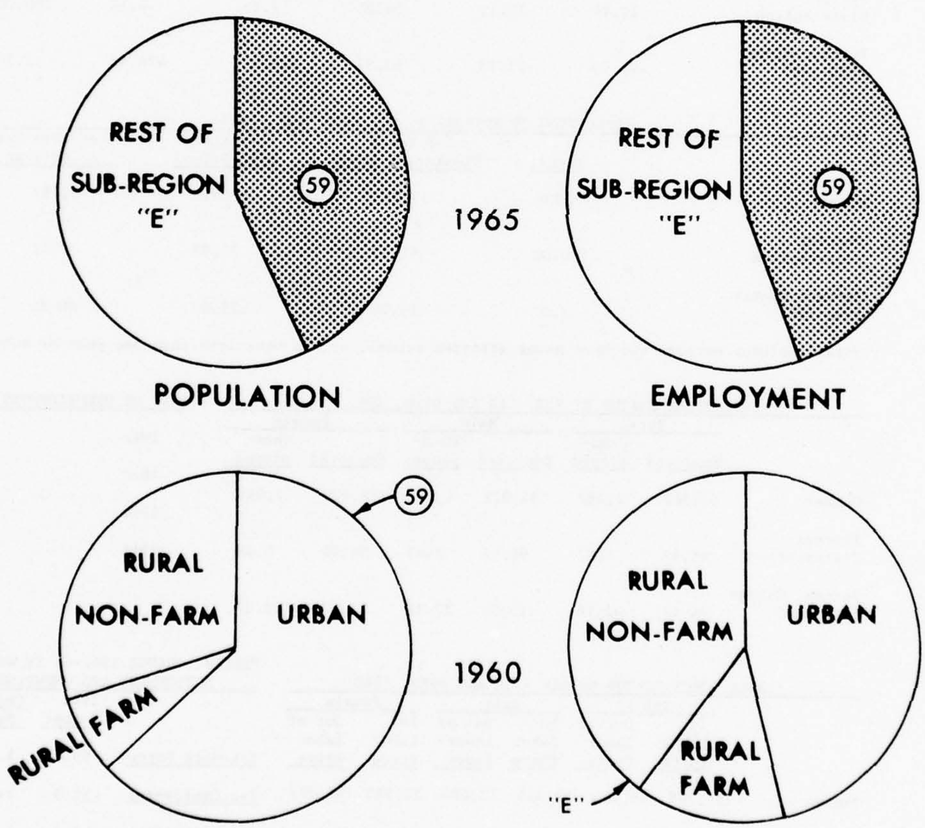

Figure 9-28. Population, Employment and Urban-Rural Population Distribution of State Planning Sub-region 59 Compared to Sub-region E

were the only counties that did not have a net increase during this five-year period. In 1960, the population was 30 percent rural non-farm, 7 percent rural farm and 63 percent urban. Some 40 percent of the population 25 years and older had attended high school, and 12 percent had one or more years of college.

The work force in the area was 413,200 in 1965. This was an increase of 17,600 or 4.4 percent over 1962. Of this number, 394,100 were employed in 1965, an increase of 27,000 or 7.4 percent over 1962. This resulted in a steady decline in the unemployment rate from 7.2 percent in 1962 to 4.6 percent in 1965. The labor force of the area shows a larger percentage to be in the skilled and service industries than in other parts of Alabama, due to the influence of Birmingham.

Manufacturing employment in the area increased from 90,100 to 93,600 during the 1954-1958 time span. Following 1958, employment declined slightly to 92,700. During this same period the value added by manufacture steadily increased from $650,358,000 to 1,130,678,000 dollars. The value added per employee also increased from $7,220 to $12,197 over this same time.

In addition to high rates of unemployment (especially in rural areas), there is substantial underemployment in the form of tendencies of farmers to continue to farm on a small scale even though the labor involved could be used more productively elsewhere, given employment opportunities. Many families of this area farm on a small scale and supply industry with labor, simultaneously. Substantial increases in productivity may be attained if sufficient amounts of industry could be attracted into the area to induce these families to abandon agriculture for industrial employment. However, a bottleneck to this solution is the high number of older farmers who may not be trainable. Labor reserve limitations in the less industrialized counties may limit the size of the industries that will locate there. However, with a substantial amount of commuting, potential manpower exists.

A well developed highway transportation system has been or will be built to serve the sub-region. The system includes Interstate 65 which connects Birmingham, Decatur and Montgomery; Interstates 20 and 59 from Birmingham through Tuscaloosa; Interstate 20 from Birmingham to Anniston and Atlanta; and Interstate 59 from Birmingham through Gadsden.

The sub-region is served by the Black Warrior and Tombigbee Waterway which connects Birmingham and the Jasper-Cordova area in Walker County with the deep-water port at Mobile.

Birmingham, along with the remainder of Jefferson County plus contiguous portions of surrounding counties, is the major area of primary

growth in Alabama. Other major centers include Tuscaloosa; Talladega; and parts of Cullman, Marion, and Winston Counties, which are extensions of the Tennessee River growth area (see Water Area J-5 in Chapter 19 of Part II). In addition, a secondary center including parts of Fayette, Lamar, and Marion Counties has been established.

Birmingham. Birmingham is the largest city in Water Sub-region E and the second largest city in Appalachia. It is exceeded in size only by Pittsburgh, which also has an iron and steel oriented economy. Birmingham was founded in 1871, grew to a population of 650,000 by 1965, and has remained the largest population concentration in Alabama since shortly after 1900.*/ The city's growth stems primarily from its iron and steel industries, but it has also taken over most of the central work functions for the State. In 1920, steel production was about 1.2 million tons. This figure advanced to approximately 3.7 million tons by 1955 and has since remained constant. At one time, Birmingham supplied more than half of the steel consumed in the South, but its sales now have dwindled to less than one-fifth of the total due to increased steel production in other Southern areas. At the time steel-producing facilities were installed in Birmingham there were relatively few southern metal using industries, and most of the steel production was destined for use in construction, railroads and agriculture. The area continues to be a major production center for such materials including cast iron pipe, but is increasingly becoming important as a producer of fabricated metal goods and transportation equipment. It has not yet become an important producer of machinery equipment.

Birmingham, and Alabama as a whole, have failed to keep pace with the remarkable growth that has occurred in the southeast in recent years. Since 1950, the southeast growth in manufacturing has, for the first time, included a large share of the nation's employment increase in metal-using industries. However, much of this growth has been in areas other than in Birmingham. Between 1950 and 1964, non-agriculture wage and salary employment increased by only 13,300 in metropolitan Birmingham. During this same period, the area lost 12,650 jobs in mining, 3,300 in primary metals and smaller losses in construction and transportation. The most important employment growth took place in transportation equipment and fabricated metals. Manufacturing employment from 1950-1965 is shown in Table 9-22.

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*/ For detail analysis of Birmingham see: The Economy of Metropolitan Birmingham. Prepared for Birmingham-Jefferson County Regional Planning Commission by Hammer, Greene, Siler Associates, Atlanta, Georgia, 1966.

TABLE 9-22
MANUFACTURING EMPLOYMENT, METROPOLITAN BIRMINGHAM, 1950-65

	Number of Employees			
	1950	1955	1960	1965
National-Regional Type				
Fabricated metals	4,700	6,100	7,100	7,800
Blast furnaces & steel works	(23,400)	(21,800)	(21,200)	(19,000)
Iron & steel foundries	(6,400)	(7,100)	(6,300)	(8,100)
Other primary metals	(1,100)	(700)	(200)	(400)
Primary metals	30,900	29,600	27,700	27,500
Transportation equipment	1,100	6,800	4,400	7,500
Non-electrical machinery	1,700	1,800	1,600	1,700
Stone, clay & glass	3,300	3,100	3,100	2,600
Chemicals	1,400	1,700	1,400	1,400
Apparel	1,000	1,100	1,000	1,100
Furniture	800	800	600	1,300
Lumber & wood products	2,500	1,900	1,200	1,200
Other National-Regional	2,000	2,400	2,800	4,000
Sub-total	(49,400)	(55,300)	(50,900)	(56,100)
Metropolitan-Service Area Type				
Food	4,800	5,300	6,000	6,000
Printing & publishing	2,000	2,200	2,300	2,600
Sub-total	(6,800)	(7,500)	(8,300)	(8,600)
Total	56,200	62,800	59,200	64,700

Source: Hammer, Greene, Siler Associates, Atlanta, Georgia.

Although no longer considered a serious contender with Atlanta as economic center of the southeast, Birmingham does serve as an important trade and service center for the state of Alabama and for many parts of Mississippi. Birmingham is the leading city in wholesale and retail sales in the state of Alabama; headquarters for the leading utility companies in the region and has the State's largest banks and insurance companies. The most significant service activity is the large medical center occupying 15 blocks and scheduled for expansion. Other service activities are the Southern Research Institute, two liberal arts colleges, and the University of Alabama at Birmingham.

Population growth has been slow since 1950 due to the lack of employment with indications that the population actually decreased between 1961 and 1962, but since, has recovered. Between 1950 and 1960, net out-migration of Negroes far exceeded net in-migration of white people, and the population in 1960 was more than 25,000 smaller than it would have been if no net out-migration had occurred. Between 1950 and 1960, there was an increase in the proportion of white collar workers and a

decrease in the proportion of those engaged as operatives, household workers, and laborers. The ratio of female workers also increased, particularly white females, while Negro male ratios fell as did those of elderly white males.

The University of Alabama, Bureau of Business Research, reported that in 1965, per capita income in metropolitan Birmingham was $2,545, near the national average of $2,724 and well above the southeast regional average of 2,075 dollars. The iron and steel industry, which pays the same in Birmingham as Pittsburgh, holds the average wage up in Birmingham over the traditional southeast industries of textiles, apparel, furniture and tobacco.

In a recent study of the Birmingham metropolitan area, Hammer, Green, Siler Associates projected that the disappointing growth rate since 1950 should change to one with more vigor. They believe Birmingham will begin to move in the same direction as the southeast as a whole. This is primarily based on the assumption that there will be a large increase in manufacturing employment, primarily in metal-using industries. The industrial pattern in the southeast is such that heavy metal goods such as agricultural machinery, heavy electrical eqipment, automobile and aircraft components and construction equipment will now be feasible to produce within the region. Birmingham's metal-producing base will have considerable more attraction for these industries than it did for the light metal industries which entered the southeast region between 1950-1964. However, it is expected that extensive changes in the production facilities will be required to make the area sufficiently competitive to attract and retain these new industries. This may mean a continued decline in employment during the next few years followed by a resumption of employment gains.

According to Hammer, Greene, Siler Associates, total employment in the metropolitan Birmingham area is expected to increase from 238,800 in 1964 to 445,900 by 1990. Unlike most other major centers, manufacturing is expected to not only hold its own, but actually increase slightly in the percentage of total employment. A gain of 62,700, or 101 percent, is anticipated. Metal-using industries will account for the largest share of the gain and are expected as follows: fabricated metals, 18,500; non-electrical machinery, 10,100; transportation equipment, 9,200, and electrical machinery, 3,500. Other manufacturing activities expected to have major increases are food products, 5,500; chemical, 3,400; and printing and publishing establishment, 3,200. The next largest numerical gains in employment is expected to be services with 38,300 additional jobs projected. These will be particularly oriented to professional and business services. Other large gains projected are retail trade, 21,400; government, 20,000, and construction, 17,600 additional jobs. It is anticipated that mining employment will decline by approximately 600, and agriculture by 700 employees. Self-employed, unpaid family and domestic workers are expected to account for an increase of about 21,000 workers.

Population is projected to grow from 637,300 in 1964, to 1,108,000 in 1990. The labor force and employment rate are expected to grow at faster rates than the population. Anticipated is a large increase in net in-commuting and a greater proportion of the population in the labor force. This will be due to a larger percentage of people in the working age groups, and more female participation.

Income levels are expected to increase considerably with projected gains in per capita income from $2,545 in 1965, to $4,125 in 1990. During the same period, households are expected to decrease slightly in size, thus, the household income will not increase as rapidly as the per capita income.

Hammer, Greene, Siler Associates have pointed out that these projections probably cannot be attained without some effort on the part of Birmingham. The community must make an effort to overcome the negative drift of the recent past. Four of the areas of concern pointed out by the consultants are: (1) industrial development efforts; (2) the local education system; (3) urban development and redevelopment alternatives, and (4) cultural amenities.

Tuscaloosa. The economic structure of Tuscaloosa has shown little change in the past few years. The major industries have been tires and tubes, pulp and paper, and fabricated metal products. With the University of Alabama located at Tuscaloosa, the trade and services sectors have shown rapid growth. This can be expected to continue, and will be supplemented by additional trade and services to the hinterlands northwest and south of the city.

Talladega . Talladega is linked with the Anniston area as a growth center. Talladega County is a predominantly urban county in east-central Alabama that has the Coosa River as its western boundary. No point in the county is more than 25 miles from the river. The dominant economic activities of the county in 1963 were manufacturing and wholesale and retail trade.

The county had 22,460 jobs in March 1966, with 9,680 of them in manufacturing. Of these, 5,140 were in the textile and apparel sectors. An increase of 1,950 was reported between 1960 and 1966.

Fayette-Lamar-Marion. A portion of the tri-county area of Fayette, Lamar and Marion Counties has been designated as a secondary growth area. The population in 1965 was estimated at 55,000. During the period 1950-1960, the area had a high out-migration rate of 15 percent; however, since 1960, the population decline has leveled out and slight growth has occurred. Agriculture has been the main form of employment, but as in most of the sub-region, this form of employment has been rapidly decreasing; in 1960, however, it was still the principal form of employment. The major sector in manufacturing was apparel followed by lumber, wood products and furniture, and textile mill products. The entire section is

not integrated into the major transportation network of the region and suffers from inaccessibility.

Cullman-Haleyville. The Florence-Decatur-Huntsville-Scottsboro Growth Center is primarily located in Water Sub-Region J; however, a small portion of it reaches into Water Sub-Region E at Cullman and Haleyville. Capital outlays for new and expanded facilities have been occurring in this area with textiles and apparel being the major industries. The manufacturing base, however, is being expanded to include food and kindred products, fabricated metals, primary metals, electrial products, etc. The University of Alabama 1/ has reported that the growth center, as a whole, offers advantages to firms producing food products, plastics, glass fibers, plumbing fixtures, fabricated metals, electrical products, and technical instruments.

The tabulations in Tables 9-23 and 9-24 present the most recent census data for the sub-region.

1/ Thompson, Arthur A. "Primary and Secondary Growth Regions in Appalachian Alabama," Alabama Business, Volume 38, No. 10 (June 15, 1968), 1-6.

TABLE 9-23
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
ALABAMA STATE PLANNING SUB-REGION 59

	1950	1960	Absolute Change
TOTAL ALL SECTORS	358,664	369,517	10,853
PRIMARY ACTIVITIES	78,369	29,639	- 48,730
Agriculture	52,066	18,928	- 33,138
Forestry & Fisheries	232	421	189
Mining	26,071	10,290	- 15,781
SECONDARY ACTIVITIES	103,336	125,556	22,220
Contract Construction	19,376	23,441	4,065
Food & Kindred Products	5,377	9,109	3,732
Textile Mill Products	9,937	8,276	- 1,661
Apparel	1,754	6,687	4,933
Lumber, Wood Products, Furniture	12,887	9,702	- 3,185
Printing & Publishing	3,167	3,903	736
Chemicals & Allied Products	1,873	3,256	1,383
Electrical & Other Machinery	2,799	4,912	2,113
Motor Vehicles & Equipment	346	750	404
Other Transportation Equipt.	780	4,420	3,640
Other & Miscellaneous	45,040	51,100	6,060
TERTIARY ACTIVITIES	172,974	204,896	31,922
Transportation & Communications	20,610	18,859	- 1,751
Utilities & Sanitary Service	4,990	6,298	1,308
Wholesale Trade	10,800	12,370	1,570
Retail Trade	49,383	55,366	5,983
Finance, Ins. & Real Estate	9,812	14,078	4,266
Personal Services	36,777	40,701	3,924
Professional Services	27,865	42,246	14,381
Recreational Services	1,946	1,996	50
Public Administration	9,760	12,492	2,732
Armed Forces	1,031	490	- 541
NOT REPORTED	3,985	9,426	5,441

TABLE 9-24
SOCIO-ECONOMIC CHARACTERISTICS
ALABAMA STATE PLANNING SUB-REGION 59
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1965	
Total	1,161,900
Absolute Change 1960-1965	40,700
Percent Change 1960-1965	3.6

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	1,121,204	543,011	578,193	78,844	336,805	705,555
Percent Distribution	100.00	48.43	51.57	7.03	30.04	62.93
Percent Change 1950-1960	5.17	4.13	6.16	-65.43	23.69	24.74

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	62,053	32,586	95,433	61,753	25,356	277,181
Percent Distribution	22.39	11.76	34.43	22.28	9.15	100.00
Percent Change 1950-1960	-46.30	-37.64	46.40	393.83	516.18	6.45

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	592,962	263,291	239,769	71,937
Percent Distribution	100.00	44.40	40.44	12.13
Percent Change 1950-1960	7.77	-8.26	37.18	34.97

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unemployed	Employed	Unemployed	Employed	Unemployed
Number	369,027	23,766	249,291	16,648	119,736	7,118
Percent Distribution	93.95	6.05	93.74	6.26	94.39	5 61
Percent Change 1950-1960	3.19	38.90	-6.22	30.00	30.40	65.38

RATE OF UNEMPLOYMENT, 1962-65

1962	7.2
1963	6.1
1964	4.8
1965	4.6

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	393,283	381,371	266,411	100,573	126,872	280,798
Percent Distribution	50.97	49.03	72.59	27.41	31.36	68.65
Percent Change 1950-1960	4.65	0.01	-4.71	21.35	31.83	-4.39

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	%
Tot. Work Force	413,200	17,600	4.4
Tot. Employment	394,100	27,000	7.4
Unemployment	19,100	-9,400	-33.0

Water Area E-5

Water Area E-5 is coterminous with State Planning Sub-region 60.

State Planning Sub-region 60

State Planning Sub-region 60 encompasses the twenty-county Appalachian area of northeastern Mississippi. The largest urban places, with 1960 populations, include Columbus (24,771) in Lowndes County, Tupelo (17,221) in Lee County, Corinth (11,453) in Alcorn County, Starkville (9,040) in Oktibbeha County, West Point (8,550) in Clay County, Amory (6,474) and Aberdeen (6,450) in Monroe County, and Holly Springs (5,621) in Marshall County.

The population of the sub-region in 1960 was 406,200, a decrease of 19,900 from 1950. About 75 percent of this loss was Negro. Between 1960 and 1965, a natural rate of increase was 7.0 percent; a net migration gain of 1.3 percent resulted in a net increase of 8.3 percent, to 440,060.

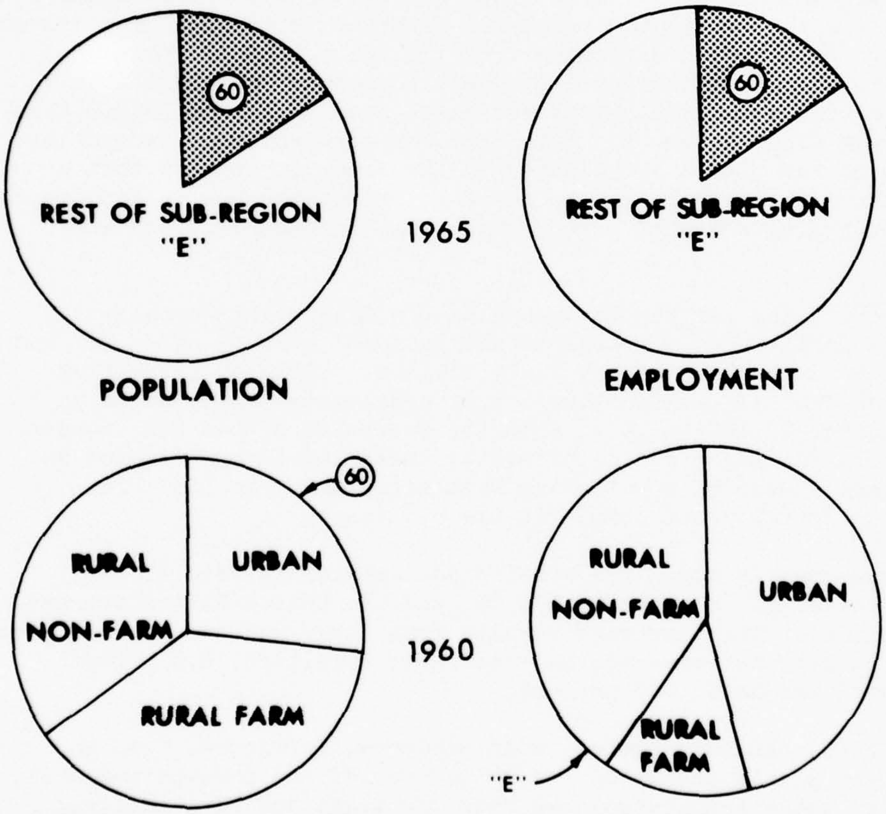

Figure 9-29. Population, Employment, and Urban-Rural Population Distribution of State Planning Sub-region 60 Compared to Sub-region E

The population of the area is predominately rural; several counties have no urban places, as defined by the U.S. Bureau of the Census. Counties without urban places in 1960 were Benton, Choctaw, Itawamba, Kemper, Noxubee, Pontotoc, Tishomingo and Webster. Lowndes County has the largest population (54,455 in 1965) and the highest population density (107.2 per square mile). The density of the sub-region, 42.6 persons per square mile, is relatively low.

During the 1940-1960 period, population and employment decreased in Mississippi Appalachia. This was the result of an economy experiencing change from one based, in large measure, on agriculture to one balanced by agriculture and industry. In 1940, 88,786 persons were employed in agriculture, and only 11,883 were employed in manufacturing. By 1960, a balance of agriculture and industry had been achieved, with 32,346 persons in agriculture and 33,597 in manufacturing. In future years, employment in manufacturing will far exceed that in agriculture. Also, substantial gains are expected in the services and government sectors of the economy.

During the 1960-1965 period, the decreasing employment trend experienced during the 1940-1960 period was reversed, with total employment in Mississippi Appalachia increasing from 134,040 to 139,774 thousand. Within this total, manufacturing employment increased from 33,602 to 39,428, and agricultural employment decreased from 32,346 to 30,910 thousand. Although figures were not published for manufacturing categories, from records on new plants established in the area, it appears that a portion of the new jobs were not in low-wage industries but in industries with wage structures somewhat higher than those of apparel, food and kindred, etc.

In 1960, the per capita income of the Mississippi Appalachian Area averaged about $950, compared to the national average of $2,161 and the Appalachian Region average of 1,405 dollars. Fifty to sixty-five percent of the families in the Mississippi Appalachian Area had an annual income under $3,000 in 1959, with the exception of Lee and Lowndes Counties, where the major factor effecting these low-income figures is the educational status of Appalachian Mississippians. In 1960, the average medium school years completed was 8.8 years.

Average weekly wages for Mississippi Appalachia were $74.03, less than Mississippi as a whole, $78.85, and the United States average of 111.92 dollars. This low wage results from large numbers of employees in low-wage industries: apparel, 34.4 percent; furniture, 8.3 percent; lumber and wood products, 6.7 percent.

In 1960, apparel, lumber, wood products, furniture, food and kindred product plants accounted for 88 percent of the persons employed. Traditionally, these industries have paid low wages and have employed large numbers of female workers. These industries, with agriculture and forestry, constitute the majority of the area's existing economic activity. The result has been employment, but employment in low-wage industries with consequent low per capita and family incomes.

In 1965, the low-wage industries--comprised mostly of food, apparel, lumber, furniture, and leather--accounted for 70 percent of the 39,428 manufacturing employees. The Mississippi Research and Development Center estimates that this will decrease to about 33 percent by 2020 with the greatest employment growth occurring in the chemical and metal-working industries.

The Memphis trade area, which exerts a strong influence on nine counties in the northwestern portion of Mississippi, extends into over half of the Appalachian counties. Other cities not within the Appalachian area which have influence include Jackson and Meridian, Mississippi. The Corinth, Tupelo and Columbus trade areas have a cohesive effect upon counties in the area, while other cities mentioned tend to influence peripheral counties and compete with Corinth, Tupelo and Columbus for their retail sales potential.

Major retail trade influence is focused on Tupelo as the primary trade center of the area. Tupelo's trade area extends into 13 of the 20 counties in the Appalachian area, as well as into Alabama. The Columbus trade area overlaps that of Tupelo and extends somewhat farther into Alabama. It covers nearly all of five counties adjacent to Lowndes County.

Employee commuting patterns indicate that the three major urban centers of Corinth, Tupelo and Columbus each have a separate sphere of commuting influence. When taken together, the three spheres extend into 17 of the 20 counties in Mississippi Appalachia. The three commuting areas slightly overlap and also extend into Alabama and Tennessee. Benton County lies between two spheres of influence--Corinth, Mississippi, and Memphis, Tennessee. Also employees in Kemper County tend to commute to Meridian outside the Appalachian area rather than to the Columbus-Starkville-West Point area.

An adequate transportation system is essential to the development of the Mississippi Appalachian Area. The twenty-county area does not have, at present, the transportation facilities needed to insure rapid growth and development. The area is conspicuously lacking in service by Interstate Highways. Interstate Highway 55 is located to the west and Interstate 20 to the south. Several non-Interstate highways connect area cities with major centers outside the region. The Natchez Trace Parkway, a Federal scenic highway, extends through northeast Mississippi from Webster County on the southwest to Tupelo in the central portion of the area; its economic impact is limited to tourist development since it is not a commercial highway. Commercial air service is provided to Tupelo and Columbus, while airports with only limited facilities are located throughout the region. A Golden Triangle Airport now under construction, equidistant from Columbus, Starkville and West Point, will provide the southern portion of the area with commercial jet service in the future. Railroad service is provided to all major cities in Mississippi Appalachia, principally via the Illinois Central and Gulf, Mobile and Ohio Railroads. The extreme northeastern tip of the Mississippi Appalachian Area is situated on the Tennessee River; however, port development has not taken place.

The Tennessee-Tombigbee Waterway project will extend from Demopolis, Alabama, on the Black Warrior River, upstream to the Tennessee River at Pickwick Reservoir, via the Tombigbee River, a canal, Mackeys Creek, a deep cut through the divide, and Yellow Creek. The project will cover a total distance of 253 miles and will involve improvement to 170 miles of river channel and construction of 45 miles of canal, 5 dams and 12 locks, and a 27-mile cut through the divide that separates the two watersheds. Counties in Mississippi Appalachia lying along the waterway including Clay, Itawamba, Lowndes, Monroe, Prentiss and Tishomingo are subject to receive the greatest economic gains from the standpoint of potential industrial location and future employment benefits. Most other counties within the Mississippi Appalachian Area will receive benefits, and many also will be directly affected by the project.

The Waterway and the south-flowing Tombigbee River will effect a new artery of commerce connecting much of the interior of the United States with the Gulf Intercoastal Waterway and the Port of Mobile. Most importantly, the Waterway will provide the development impetus for the areas of Mississippi, Tennessee and Alabama within its influence. The facility will provide transportation, industrial and domestic water and recreational opportunities. All of these affect the potential for development for the area. Similarly, the Tennessee Valley area was able to increase its per capita income from 45 percent of the nation's average to 69 percent, and add some 450,000 new manufacturing jobs.

The nation as a whole will benefit from the Waterway in that it will provide an economical means to ship a variety of bulk raw materials. These include bauxite, coal, chrome ore, manganese, iron ore, sulphur, industrial salt, and petro-chemicals. Also, it may afford the most economical means for shipping many manufactured products produced on the Gulf Coast, such as kraft paper. Other shipments may include grain, poultry, and fertilizer.

The twenty-county Mississippi Appalachian Area has been subdivided into five multi-county areas for planning and development purposes. In keeping with the dictates of the Appalachian Development Act, primary and secondary growth areas have been defined in order to determine where the magnitude of investment should be greatest. Also, the balance of the twenty-county area is defined as natural resource areas.

Regional Economic Area I consists of the counties of Choctaw, Clay, Kemper, Lowndes, Noxubee, Oktibbeha, Webster and Winston; Area II, Monroe County; Area III, Chickasaw, Itawamba, Lee, Pontotoc and Union; Area IV, Alcorn, Prentiss, Tippah, and Tishomingo; and Area V, Benton and Marshall.

Five primary growth areas have been defined within the twenty-county area. They include:

Regional Economic Area I -- The "Golden Triangle Area" of Columbus-Starkville-West Point

Regional Economic Area II -- The Amory-Aberdeen area in Monroe County

Regional Economic Area III -- The Pontotoc-Tupelo-Fulton-Baldwin corridor along State Highway 6 and U.S. Highway 78

Regional Economic Area IV -- The Corinth-Booneville-Iuka area which includes the proposed Yellow Creek port development and the recreation areas along Lake Pickwick Reservoir

Regional Economic Area V -- Holly Springs growth area, including two rural counties in the northwest sector of Mississippi Appalachia. (Holly Springs is near the Memphis, Tennessee metropolitan area and in the future will be influenced by the development of the Memphis area)

Columbus-Starkville-West Point. Within Regional Economic Area I, major development will center around the cities of Columbus, Starkville, and West Point. Individually, these cities are small centers for commerce and industry; collectively, they have the potential to develop into a metropolitan area.

This "Golden Triangle Area" of Mississippi has a predominance of low-wage industries resulting in low per capita incomes equaling only 48 percent ($963) relative to 1960 United States per capita income. Employment in industrial sectors which pay relatively high wages was generally nonexistent. Paper, chemicals, petroleum, and primary metals accounted for less than 10 percent of the total manufacturing employment. In fact, if it were not for the location of the colleges and universities in the area, with relatively well-paid staff, per capita income would have been even less.

Counties in the southern portion of Mississippi Appalachia are tied economically to Columbus-Starkville-West Point. If this tri-city area is to provide a substantial portion of the future job base for the area, major problems including the following, must be overcome:

(1) A predominance of low-wage industries and underdevelopment of the economy;

(2) Inadequate transportation facilities;

(3) Limited skills and limited opportunity to obtain needed vocational and technical training in the area;

(4) Inadequate infrastructure required to make communities attractive to industry;

(5) Limited supply of good industrial land to meet the needs of industry, particularly large cities.

Corinth-Booneville-Iuka. The pattern of economic evolution in Regional Economic Area IV is similar to that of other Mississippi Applachia areas. In 1940 the economy was predominantly dependent upon agriculture, with over one-half of the work force so employed. By 1960, only 24 percent (5,921) of the work force was engaged in agriculture. During the same period, employment in manufacturing increased from 2,806 to 7,202 persons, or from about 10 to 30 percent of the work force. However, much of the employment gained in the area was of the low-wage variety, resulting in a per capita income in 1960 of only $885, or 44 percent U.S. average. Employment gains during the 1940-1960 period were also evident in the trade and services sectors of the economy.

In Regional Economic Area IV, major development will occur from Booneville to Corinth and Iuka. Included in this area is the proposed industrial complex at Lake Pickwick Reservoir and the Yellow Creek Port. Secondary centers include Tishomingo, Ripley, Walnut and Belmont.

Corinth has been developing as a minor manufacturing center and retail service center. The city of Booneville is the location of Northeast Mississippi Junior College, and its primary contribution to growth will relate to educational opportunities for the people of the area.

The area has access to the inland waterway system via Lake Pickwick Reservoir and the Tennessee River. In the future, economic development will be closely related to advantages obtained from water transportation. Industries which can use this advantage will include: food, pulp and paper, chemicals, stone, clay and glass, primary metals, forest products and grain, etc.

Holly Springs. Benton and Marshall Counties comprise Regional Economic Area V and are characterized by similar socio-economic and physcal development problems common to the Appalachian Region. The area had only 247, or 2.2 percent of employees in manufacturing in 1940. By 1960, 15.6 percent, or 1,364 employees, were engaged in manufacturing industries. During the same period, agricultural employment decreased from 79.1 percent of total employment to 43.7 percent. This increase in industrial jobs increased per capita income in the area from 20 percent ($244) to 30 percent ($591) relative to the United States, while increasing earnings per worker from a decisively low of $690 to $1,912 which is still only 45 percent relative to the nation.

Regional Economic Area V has one development center--the city of Holly Springs and its environs. The region is heavily influenced by the city of Memphis, which provides commercial and industrial advantages not available in the two counties.

Pontotoc-Tupelo-Fulton-Baldwin. Primary growth in Regional Economic Area III is shown in an elongated fashion from Pontotoc on the west to

Fulton on the east, and Baldwin to the north with the city of Tupelo at the center. Secondary centers include Houston, Okolona, Nettleton-Shannon, and New Albany.

Regional Economic Area III is centered on the city of Tupelo. In 1940, the area had 23,753 persons employed in agriculture out of a total employment of 35,678 persons. Only 1,035 manufacturing jobs existed in the area. By 1960, agricultural employment had declined to 8,368 persons and manufacturing employment had increased to 11,079 jobs. The main effect of this increase in industrial jobs has been to increase the per capita income in the area relative to the United States from 31 to 50 percent ($369 to $993). Earnings per worker have increased from a low 40 percent ($1,112) to 55 percent ($2,341) relative to the United States. However, employment in the area is concentrated in low-wage industries as reflected in the low per capita income figures as compared to the United States. Other sectors of the economy where gains were made in employment during the 1940-1960 period include transportation, trade and services; however, losses in agriculture were so great that total employment remained relatively constant.

Amory-Aberdeen. Within Regional Economic Area II, the primary growth area will extend as a corridor of development between the cities of Amory and Aberdeen. This corridor will develop primarily as a recreational area with industrial concentrations in the Amory area adjacent to the Tennessee-Tombigbee Waterway; near the Monroe County Airport (with access to the Waterway via a turning basin); and to the south of the city of Aberdeen. Approximately 90 percent of the new development in the county is anticipated to occur in the primary growth area.

The city of Amory, located in north central Monroe County, has traditionally been associated with the development of the city of Tupelo. Aberdeen, located in south central Monroe County, has been traditionally tied to the Columbus-Starkville-West Point area. In the future, and particularly after the completion of the Tombigbee Waterway, Monroe County is expected to become one economic entity. Industry is expected to locate in the county, providing jobs in the local economy; and the existing communities should develop as centers of commerce.

Regional Economic Area II had, in 1960, a total employment of 12,000 with a relatively high 32.0 percent in manufacturing, as compared with Regional Economic Area I (19.6 percent). However, wages are low, and the female/male ratio is high, resulting in a 1960 per capita income of $1,024 or 51 percent of the U.S. average. Non-manufacturing employment has remained relatively stable during the 1940-1960 period, with slight gains in the trade and services categories. Employment in agriculture decreased from 7,927 in 1940 to 2,187 in 1960, and the increased manufacturing and non-manufacturing employment was barely sufficient to maintain the same total employment in 1960 as in 1940.

Employment in the heavy water-using industries was practicially nonexistent in 1960. With the advent of the Tombigbee Waterway opportunities

for development of water-using industries will be greatly enhanced. Non-manufacturing employment has remained relatively stable during the 1940-1960 period, with slight gains in the trade and services categories.

The tabulations in Tables 9-25 and 9-26 present the most recent census data for the sub-region.

TABLE 9-25
EMPLOYMENT BY SECTORS FOR 1950 AND 1960
MISSISSIPPI STATE PLANNING SUB-REGION 60

	1950	1960	Absolute Change
TOTAL ALL SECTORS	140,088	134,040	- 6,048
PRIMARY ACTIVITIES	71,609	32,057	- 39,552
Agriculture	71,251	31,341	- 39,910
Forestry & Fisheries	186	401	215
Mining	172	315	143
SECONDARY ACTIVITIES	21,859	40,743	18,884
Contract Construction	5,405	7,746	2,341
Food & Kindred Products	1,637	3,244	1,607
Textile Mill Products	667	565	- 102
Apparel	5,287	12,608	7,321
Lumber, Wood Products, Furniture	6,744	8,249	1,505
Printing & Publishing	357	581	224
Chemicals & Allied Products	370	464	94
Electrical & Other Machinery	324	2,677	2,353
Motor Vehicles & Equipment	39	317	278
Other Transportation Equipt.	6	115	109
Other & Miscellaneous	1,023	4,177	3,154
TERTIARY ACTIVITIES	44,260	58,827	14,567
Transportation & Communications	3,839	4,291	452
Utilities & Sanitary Service	1,065	1,479	414
Wholesale Trade	2,289	2,383	94
Retail Trade	13,474	16,286	2,812
Finance, Ins. & Real Estate	1,127	1,895	768
Personal Services	10,843	14,361	3,518
Professional Services	8,439	11,465	3,026
Recreational Services	455	456	1
Public Administration	2,587	3,774	1,187
Armed Forces	142	2,437	2,295
NOT REPORTED	2,360	2,413	53

TABLE 9-26
SOCIO-ECONOMIC CHARACTERISTICS
MISSISSIPPI STATE PLANNING SUB-REGION 60
(For Dates and Periods Indicated)

ESTIMATED POPULATION 1965	
Total	440,100
Absolute Change 1960-1965	33,900
Percent Change 1960-1965	8.3

POPULATION 1960	Total	Male	Female	Rural Farm	Rural Non-Farm	Urban
Number	406,187	199,206	206,981	152,745	142,297	111,145
Percent Distribution	100.00	49.04	50.96	37.61	35.03	27.36
Percent Change 1950-1960	-4.67	-5.30	-4.05	68.17	-44.72	42.79

DISTRIBUTION OF FAMILIES BY INCOME, 1960

	Under $2000	$2000-$2999	$3000-$5999	$6000-$9999	$10,000 & Over	Total
Number	40,158	14,743	27,824	11,258	3,464	97,447
Percent Distribution	41.21	15.13	28.55	11.55	3.55	100.00
Percent Change 1950-1960	45.03	21.14	162.61	643.10	364.97	-3.30

EDUCATION OF PERSONS 25 YRS. AND OVER, 1960

	Total	1-8 Years Elementary School	1-4 Years High School	1 or More Yrs. of College
Number	204,660	104,315	72,102	21,944
Percent Distribution	100.00	50.97	35.23	10.72
Percent Change 1950-1960	2.61	-16.70	24.44	33.76

Total includes persons who have never attended school, or who have less than one year of schooling.

EMPLOYMENT STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	Employed	Unem-ployed	Employed	Unem-ployed	Employed	Unem-ployed
Number	131,603	7,035	87,498	4,285	44,105	2,750
Percent Distribution	94.93	5.07	95.33	4.67	94.13	5.87
Percent Change 1950-1960	-5.96	109.31	-19.33	97.28	40.08	131.29

RATE OF UNEMPLOYMENT, 1962-65

1962	8.0
1963	6.3
1964	7.0
1965	5.6

LABOR FORCE STATUS BY SEX - 14 AND OVER, 1960

	Total		Male		Female	
	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force	In Labor Force	Out of Labor Force
Number	141,075	135,885	94,208	39,259	46,867	96,626
Percent Distribution	50.94	49.06	70.59	29.42	32.66	67.34
Percent Change 1950-1960	-1.66	-7.97	-14.94	26.13	43.35	-17.08

Includes persons in the Armed Forces.

PERCENT CHANGE 1962-65 IN WORK FORCE, EMPLOYMENT AND UNEMPLOYMENT

	1965 Number	Chng. 1962-65 No.	Chng. 1962-65 %
Tot. Work Force	149.4	2.3	1.6
Tot. Employment	141.1	5.8	4.3
Unemployment	8.4	-3.4	-28.8

DEVELOPMENT
OF
WATER RESOURCES
IN
APPALACHIA

MAIN REPORT
PART II
SHAPING A PLAN

CHAPTER 10 - SHAPING THE PLAN FOR SUB-REGION E

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CHAPTER 10 - SHAPING THE PLAN FOR SUB-REGION E

SECTION I - FUTURE GROWTH PATTERNS

1. WATER SUB-REGION

Projections of the future levels of employment (by sector) and population for Economic Sub-regions 21, 24, 25, 26 and 27, which currently cover Water Sub-region E, were prepared by the Office of Business Economics. (See Figures 10-1 for delineation of planning areas.) These projections were then aggregated and disaggregated to Water Areas E-1 through E-5 shown below:

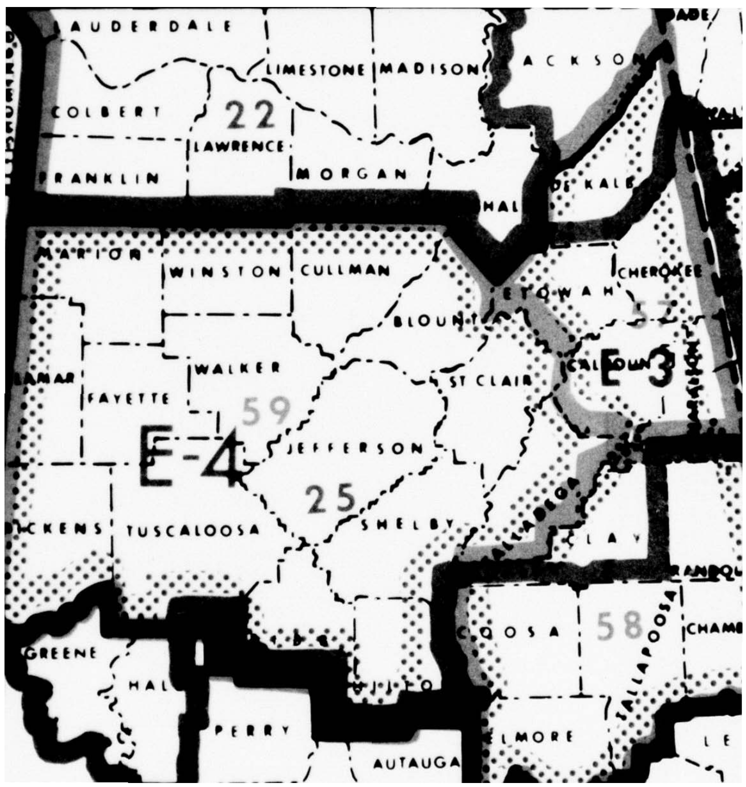
	Years			
	1960	1980	2000	2020
	(Thousands)			
E-1				
Population	252.4	328.0	491.0	754.0
Employment	86.3	115.0	176.0	279.0
E-2				
Population	303.3	388.0	532.0	745.0
Employment	111.5	145.0	199.0	276.0
E-3				
Population	407.5	563.0	767.0	1,040.0
Employment	140.7	199.0	278.0	388.0
E-4				
Population	1,121.2	1,481.0	1,925.0	2,592.0
Employment	369.5	510.0	679.0	947.0
E-5				
Population	406.2	491.0	617.0	793.0
Employment	134.0	167.0	216.0	285.0
Total				
Population	2,490.6	3,251.0	4,332.0	5,924.0
Employment	842.0	1,136.0	1,548.0	2,175.0

The economy of the sub-region, as with other regions of Appalachia, has consistently lagged behind the Nation as a whole. This gap has been reduced in recent years, but the above projections based on historical trends indicate that the sub-region's economy will continue on a lower relative level for the foreseeable future. Historical trends, however, do not reflect the intent of the Appalachian Regional Development Act of 1965, as amended, which envisions certain fundamental changes in the regional economy in response to a restated, and substantially altered,

national policy for resources development in Appalachia. Planning for water resources development to meet existing and future needs therefore must include an analysis of the sub-region's economy, both with and without this stimulus. Therefore, the developmental benchmarks for Water Sub-region E reflect a growth rate which begins to approach that projected for the Nation. These developmental benchmarks are as follows:

	Years		
	1980	2000	2020
	(Thousands)		
E-1			
Population	380	537	763
Employment	130	207	296
E-2			
Population	420	592	773
Employment	155	215	300
E-3			
Population	563	775	1,081
Employment	207	299	419
E-4			
Population	1,481	2,095	2,834
Employment	527	825	1,100
E-5			
Population	597	852	1,112
Employment	203	300	400
Total			
Population	3,441	4,851	6,563
Employment	1,222	1,846	2,515

The projections that were made of Sub-region E's economy for this report are shown on Figures 10-2, 10-3 and 10-4. Figure 10-2 shows the population index of change and Figure 10-3, the employment index of change for the period from 1960 to 2020. Figure 10-4 projects the per capita income of the sub-region to 2020 expressed in terms of percent of the United States as a whole. As may be seen, two sets of projections are given; one depicting the sub-region's growth based on a continuation of historical trends and the second, the growth that would occur with a properly planned and executed Appalachian Regional Development Program. The latter or stimulated growth (developmental benchmarks), assumes that (1) Sub-region E will maintain the same relative population growth



LIMESTONE
MADISON
COLBERT
22
LAWRENCE
FRANKLIN
MORGAN
MARION
WINSTON
CULLMAN
CHEROKEE
ETOWAH
BLOUNT
E-3
WALKER
ST CLAIR
FAYETTE
59
E-4
JEFFERSON
25
SHELBY
TUSCALOOSA
GREENE
PERRY
AUTAUGA
COOSA
58
TALLAPOOSA
ELMORE
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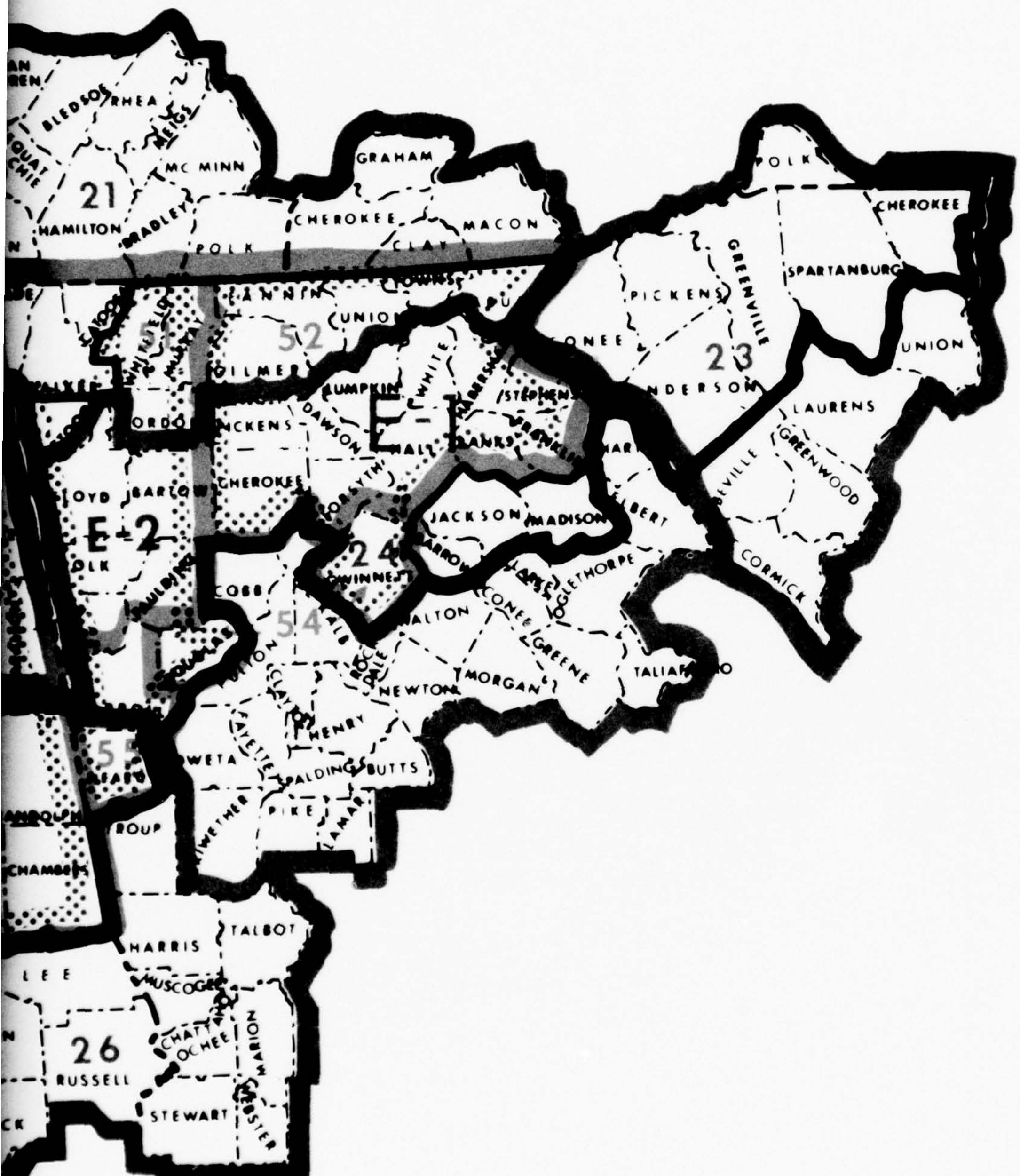

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LEGEND

APPALACHIAN REGIONAL BOUNDARY

WATER SUB-REGION E BOUNDARY

E-1 WATER SUB-AREA BOUNDARY

23 ECONOMIC SUB-REGIONS

54 STATE PLANNING SUB-REGIONS

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA
WATER SUB-REGION E

PLANNING AREAS

OFFICE OF APPALACHIAN STUDIES JUNE 1968

II-10-3 **FIGURE 10-1**

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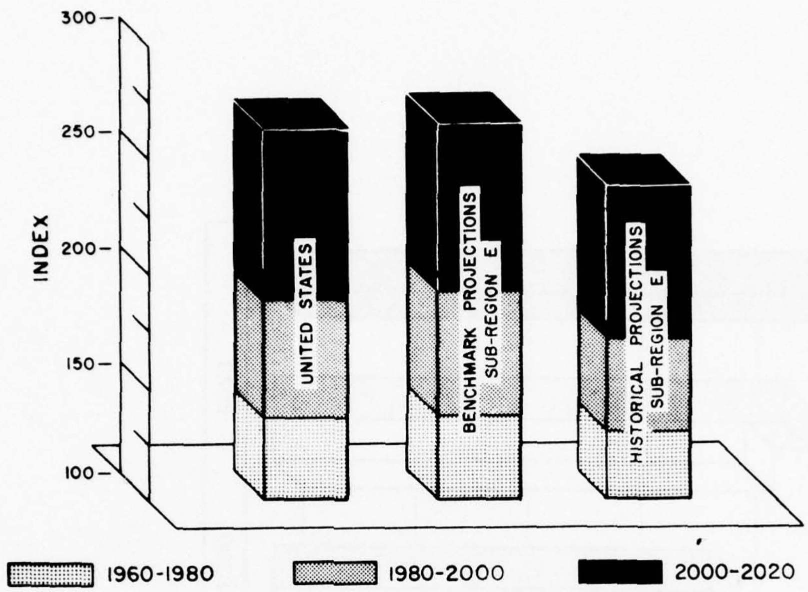

FIGURE 10-2 WATER SUB-REGION E AND UNITED STATES
POPULATION INDEX OF CHANGE

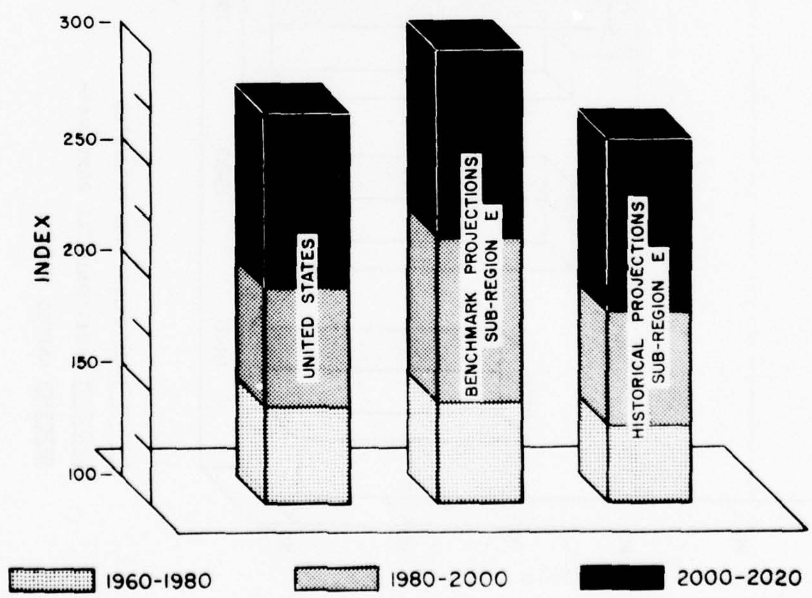

FIGURE 10-3 WATER SUB-REGION E AND UNITED STATES
EMPLOYMENT INDEX OF CHANGE

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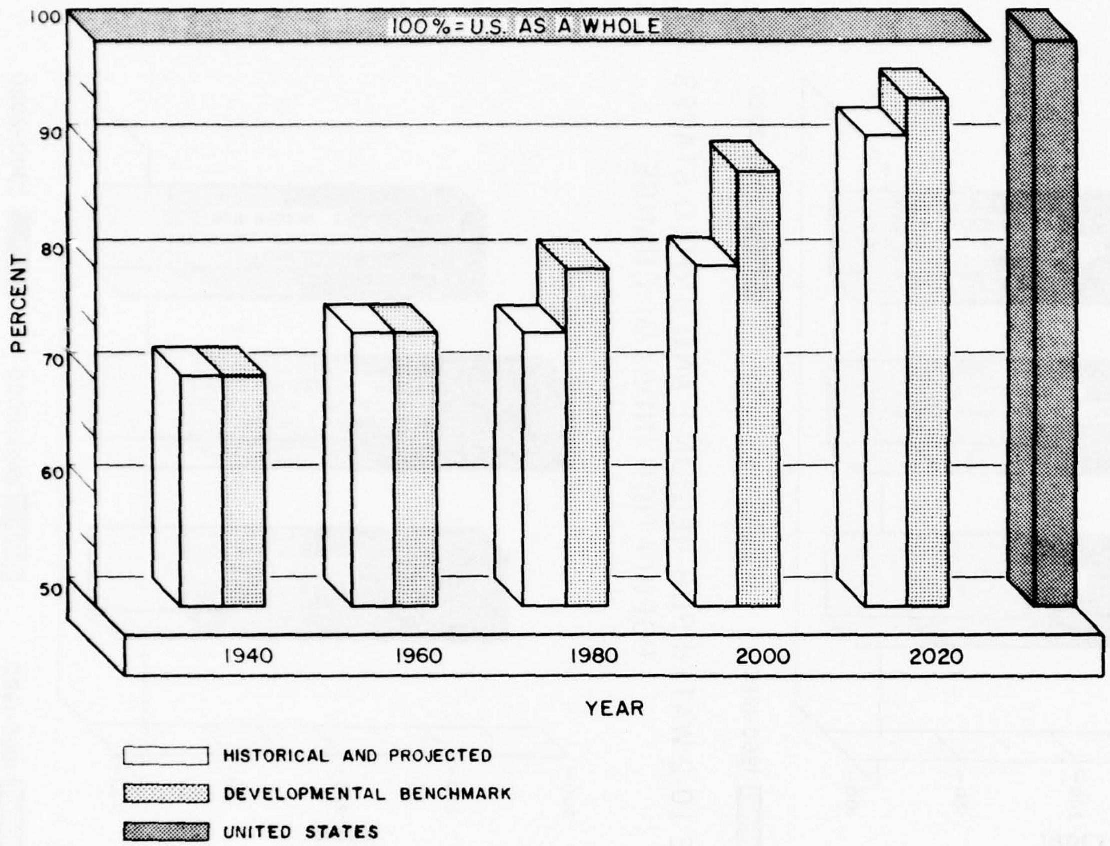

FIGURE 10-4 PER CAPITA INCOME, WATER SUB-REGION E, PERCENT OF UNITED STATES

rate after 1980 as the United States as a whole; (2) the per capita income of the sub-region will increase to at least 95 percent of the national average by the year 2020; and (3) its population per worker will decrease to 2.58 by the year 2020. These benchmarks (see Appendix E for specific numbers) clearly envision the reversal of a long established trend of low wages and out-migration from Sub-region E. The gap between projections and benchmarks is a rough measure of the developmental objectives of the state and Federal agencies assisting the Appalachian Regional Commission. Whether this gap can be met within the period covered by the Water Resources Survey is problematical. The degree to which water resources development can help attain the benchmarks is the essence of this chapter. The benchmarks are only planning tools and where proven unrealistic will require adjustments upwards or downwards.

2. STATE PLANNING SUB-REGION

As previously discussed, Water Sub-region E has also been divided by the states into State Planning Sub-regions. The developmental benchmark objectives have been disaggregated on this set of boundaries as follows:

State Planning Sub-region			Years 1960	1980	2000	2020
Georgia	51	Population	319,800	419,000	600,000	800,000
		Employment	116,600	192,000	219,000	310,000
Georgia	52	Population	208,900	310,000	435,000	601,000
		Employment	70,900	104,000	165,000	234,000
Georgia	54	Population	60,300	108,000	154,000	241,000
		Employment	21,000	38,000	62,000	93,000
Georgia	55	Population	41,800	64,000	77,000	86,000
		Employment	15,200	25,000	30,000	33,000
Alabama	57	Population	261,500	397,000	530,000	742,000
		Employment	86,700	146,000	204,000	288,000
Alabama	58	Population	146,000	166,000	245,000	339,000
		Employment	54,000	61,000	95,000	131,000
Alabama	59	Population	1,121,200	1,481,000	2,095,000	2,834,000
		Employment	369,500	527,000	825,000	1,100,000
Miss.	60	Population	406,200	597,000	852,000	1,112,000
		Employment	134,000	203,000	300,000	400,000

A more detailed description of the historical and benchmark projections is given in Appendix E to the Main Report.

3. DEVELOPMENTAL CONSTRAINTS

Attaining benchmark growth is deemed dependent upon stimulation of the sub-region's economic sectors through investments (Federal, state, local and private) made under a well-conceived Regional Development Program. This program is designed to eliminate existing and foreseeable future obstacles to economic growth in order to attain the planning goals of the sub-region, as well as Appalachia as a whole. Accomplishment of these goals will require dedicated and coordinated efforts of the affected state and local governments, the Federal government and local public and private organizations. Most important, the program must have the support and assistance of the local people.

The efforts of the Federal government should be oriented toward the construction of projects and implementing programs which will provide the greatest initial stimulus to economic growth and development. These efforts must be fully coordinated with state and local governments, as well as with private intersts, in all stages of planning to assure a comprehensive approach and sound solution to the problems involved. State and local governments have a responsibility for establishing and maintaining adequate planning and similar organizations in order to assure full coordination efforts and to effectively utilize the financial and other assistance available from the Federal government under the Appalachian Regional Development Program and other improvement programs. Their investments for improvements, if made in keeping with the intent of the Appalachian Regional Development Act, will provide the basis or inducement for investments by the private sector which will be necessary for sustained growth.

Water, in its general abundance, is one of the sub-region's major blessings but, its improper and shortsighted uses and controls have created existing and potential future problems. Rural and urban areas throughout the region are subject to flooding to varying degrees. Municipal and industrial water supplies are presently inadequate in some areas during extreme dry periods and reaches of some streams are polluted by municipal sewage and industrial effluents. Solutions to these problems must be obtained in order not to retard future growth. Water supply needs in the sub-region will increase about six times in the foreseeable future, a large part of which must be obtained from surface sources. A major program is needed for reducing the volume and the treating of sewage and industrial effluents that are discharged into the streams. Even so, augmentation of low stream flows will be required in some localities to restore and maintain the water quality at acceptable standards. In some areas, the water supply and quality problems are susceptible to solution on the local level; the major problems, however, must be approached from a comprehensive planning standpoint not necessarily limited by watershed boundaries.

Water transportation facilities have long been an important factor in the economic growth of the southeastern United States; however, the major portion of the sub-region has not benefited from the development of this potential of its streams. Modernization of the Black Warrior and Tombigbee River Waterway initiated 30 years ago is now nearing completion but other improvements to the waterway will be needed, probably in the next two decades, to accommodate the growing traffic on this artery. This waterway serves the central portion of the sub-region. By 1980 a modern waterway (Tennessee-Tombigbee) serving the western portion of the sub-region, other Appalachian sub-regions to the north, and the mid-west portion of the Nation will be effective in altering the competitive position of industrial activity in those areas. Also, the need for barge navigation in the mid-section of the sub-region (Alabama-Coosa Rivers) exists. Construction of a navigation channel in the Alabama River is now underway and development of the Coosa River portion of this system has been found to be warranted. A report on the economics of the Coosa River project is contained in Chapter 9 of Part III of this report. The Tennessee River Waterway borders the sub-region in northwestern Mississippi but no port development has occurred in the area. A port at Yellow Creek, however, is recommended in this report.

The productivity of agricultural land has steadily increased in recent years, assisted by programs provided by the U.S. Department of Agriculture and the States of Georgia, Alabama, and Mississippi and the innovative skills of the agricultural industry. This trend should be accelerated by more intensive research to further improve agricultural land management and conservation techniques; individual farm operators should be encouraged to apply the latest techniques as soon as they are developed. Soil conservation districts need to update their long-range programs to better identify present and future needs and opportunities for the conservation and development of agricultural land and other renewable resources. State and local laws should be reviewed to assure that adequate legislation is available for the formation of planning, drainage and water management districts and similar organizations with proper authority to assume these responsibilities.

Timber is one of the sub-region's more valuable assets. In 1962, the annual cut of over 200 million cubic feet was about one-half the net annual volume of timber growth on its commercial forest land. The present excess of growth over cut, however, does not warrant a general increase in cutting because growth is occurring mainly in small trees, and much of the commercial forest land is currently understocked for optimum timber production and watershed protection. The development of better methods to obtain higher productivity of the timber resources, additional stocking, land treatment measures, and adequate fire protection would assist in maintaining a favorable balance between growth and cut.

Transportation in the sub-region in the past has been a limiting factor of economic growth and development. Measures are now underway or

being planned to remedy this deficiency, but much still remains to be done to obtain parity with other regions of the Nation. In addition to the navigation system previously discussed, a highway system is now being implemented for the sub-region to provide important new linkages with major commercial centers of other regions. Additional studies must be made on a continuing basis to assess future highway needs so that the sub-region's highway system will never again be a retarding factor in its economic growth. Air transportation is being improved; nevertheless, other improvements and upgrading of the sub-region's commercial and general aviation airports and the construction of new airports will be needed as the economy expands. Continual review of the air transportation needs will be necessary to provide commercial air service commensurate with the fast-growing general aviation requirements to reach and maintain a level of service comparable with other regions of the Nation. Continuation of the modernization program for existing waterways is needed to prevent costly delays in shipping time and to provide better service to users and industrial interests of the sub-region. The updating of the sub-region's rail systems to provide more efficient operations and timely delivery could be accomplished by car and engine modernization, and rail improvements.

Without a future infusion of venture capital into the sub-region, many investment opportunities attempted by individual entrepreneurs may be stymied and, as a result, potential new employment opportunities will be lost. Increased capital formation through expansion of income flows in the sub-region will be required and accelerated participation of small investment companies and other related capital organizations is essential. The purpose of the total plan for the sub-region (water resources developments and all other programs and features) is to develop these required inflows. A continuing and sustained growth is dependent upon additional job opportunities which must be created through more effective utilization of the sub-region's natural resources, labor productivity, transportation facilities, locational advantages and its inherent industrial opportunities.

Out-migration of the sub-region's population in the past has resulted in manpower problems for the sub-region's development. It is essential that the net outflow be reduced or reversed through the creation of adequate job opportunities stimulated by the investment resulting from the Regional Development Program. At the same time, efforts must be made at the local levels to upgrade and expand the skills of the labor force through general vocational and technical training programs and continuing education. This will require expansion of existing technical training programs. In addition, educational facilities must be upgraded and expanded to rapidly increase the educational level and skills of the sub-region's inhabitants consistent with the national average.

The effective accomplishment of the program discussed above and the subsequent reduction of unemployment and underemployment, the raising of the population's standard of living, and improvement of its social and economic character should result in an accelerated rise in incomes approaching the national average brought about by the investment stimulation. The rising incomes should produce capital formation which in turn should produce new investment opportunities, spawning new rounds of economic response in both the private and public sectors of the sub-region's economy.

4. PATTERN OF GROWTH ANTICIPATED

Over the past several decades Water Sub-region E has been changing from an agrarian economy to an industrial economy. The manufacturing activities have included textiles, apparel, paper and wood products and in the Birmingham area, steel. To illustrate this trend, agriculture accounted for 27.2 percent of total earnings in 1929 compared to a national average of 11.3 percent. By 1966, these percentages had been reduced to 6.3 for the sub-region and 4.0 for the nation. For the same years, manufacturing accounted for 20.4 percent and 37.5 percent of total earnings for this sub-region compared to 25.5 percent and 30.0 percent for the nation. As industry has become more developed in the sub-region, it has also become more diversified. In addition to those industries previously mentioned, food processing, transportation equipment, fabricated metals, electrical machinery and supplies have also been increasing in the sub-region.

The textile and apparel industries are located in many parts of the sub-region. Some of the major textile centers include Dalton, Rome and Gainesville in Georgia, and Anniston, Talladega, and Gadsden in Alabama. Georgia mills tend to specialize in tufted carpet products and broad weaves, while about two-thirds of Alabama's mills are seamless hosiery and fabric mills. Apparel manufacturing accounted for 34.4 percent of Appalachian Mississippi's manufacturing employment in 1966.

Steel reached a peak production of about 3.7 million tons per year in 1955 and has remained about constant since then. At one time, Birmingham supplied more than half of the steel consumed in the south, but its sales, as a result of increased use of steel products from other areas, are now less than one-fifth of the total. Alabama, however, continues to be a leader in the production of cast iron pipe and expansion is occurring in the fabricated metals and non-electrical machinery. This trend is expected to continue. The industrial pattern in the southeast is such that heavy metal goods such as agriculture machinery, heavy electrical equipment, automobile and aircraft components and construction equipment will now be feasible to produce in the region. The Alabama metal producing base will have considerably more attraction for these industries. Indications are that the use of low-grade iron ores may become feasible for the production of iron

and steel. If this occurs, the production of iron and steel in the Birmingham area could increase, as there are substantial reserves of low-grade ore remaining in the area.

In 1960, more than 63,000 persons were employed in the textile trade in Sub-region E; 25.5 percent of the Appalachian and 16.3 percent of the U.S. totals. Benchmark projections show a total of 92,000 employees in the textile industry by 2020, while projections prepared by the Office of Business Economics (OBE) indicate that employment in the sub-region's textile industry will grow to 85,000 persons by 2020, an absolute increase of 22,000 from 1960. This 2020 figure, approximately 25 percent of the Appalachian and 7.2 percent of the national projected textile employment, suggests that the relative importance of textiles will decline within the sub-region.

Despite the absolute gains, textile employment will occupy a decreasing relative position in the region with regard to both the total and manufacturing employment. Textile employment, relative to total employment in Water Sub-region E, is projected by OBE to decrease to 3.9 percent in 2020 from the 1960 level of 7.5 percent. Its relationship to all manufacturing employment will also decrease from 23.4 percent to 12 percent. Given a successful Appalachian program, the 2020 benchmark figures indicate 3.7 percent of total employment and 11.5 percent of manufacturing employment would be in the textile industries.

Employment in food processing activities which totaled 22,000 in 1960, is concentrated in the larger cities. OBE projections to 2020 show employment increasing to 59,000 while benchmarks indicate an anticipated employment of 68,000. The greatest absolute concentration will persist in area cities; however, food processing will have significant relative importance in smaller towns such as poultry processing in Gainesville, Georgia.

Of the other major water-using industries, paper and chemicals are the ones expected to increase the most. Projections by OBE show employment in chemicals will increase from 7,000 in 1960 to 31,000 in 2020. The paper industry is similar with increases from 7,000 to 44,000. Benchmark projections for these industries in 2020 are 40,000 and 46,000 employees, respectively.

Under the Appalachian program, it is expected that over time some of the employment in textiles, apparel, lumber and wood products will be transferred to the more skilled industries such as metal fabricating, electrical and machinery supplies, tires and rubber manufacturing, transportation equipment, paper and chemicals. Mississippi, in particular, anticipates the chemical industry will locate along the Tennessee-Tombigbee Waterway, where there is now primarily low-skilled apparel workers.

It is anticipated that future growth will occur in twenty-four growth centers in the sub-region, plus Atlanta (including Marietta and other urban centers of the SMSA) which is bordered on three sides by Appalachia. It is anticipated that Atlanta will continue to be the major city of the southeast. In addition to being a major service center, Atlanta will also provide employment in manufacturing industries such as motor vehicles, aircraft and related industries. Within the sub-region, Birmingham, the second largest in Appalachia, is the major city. In addition to the steel and related industries, Birmingham is expected to have an increasing role as a major service center. The twenty-four growth centers are contained in thirteen growth areas for which the population projections and employment projections are shown in Figures 10-5 and 10-6.

5. ADDITIONAL CENTERS HAVING POTENTIAL FOR GROWTH

Many urban areas not presently identified as growth centers are located in the sub-region. However, those having significant growth potential have been identified in State Investment Plans and other Appalachian publications and have been discussed previously.

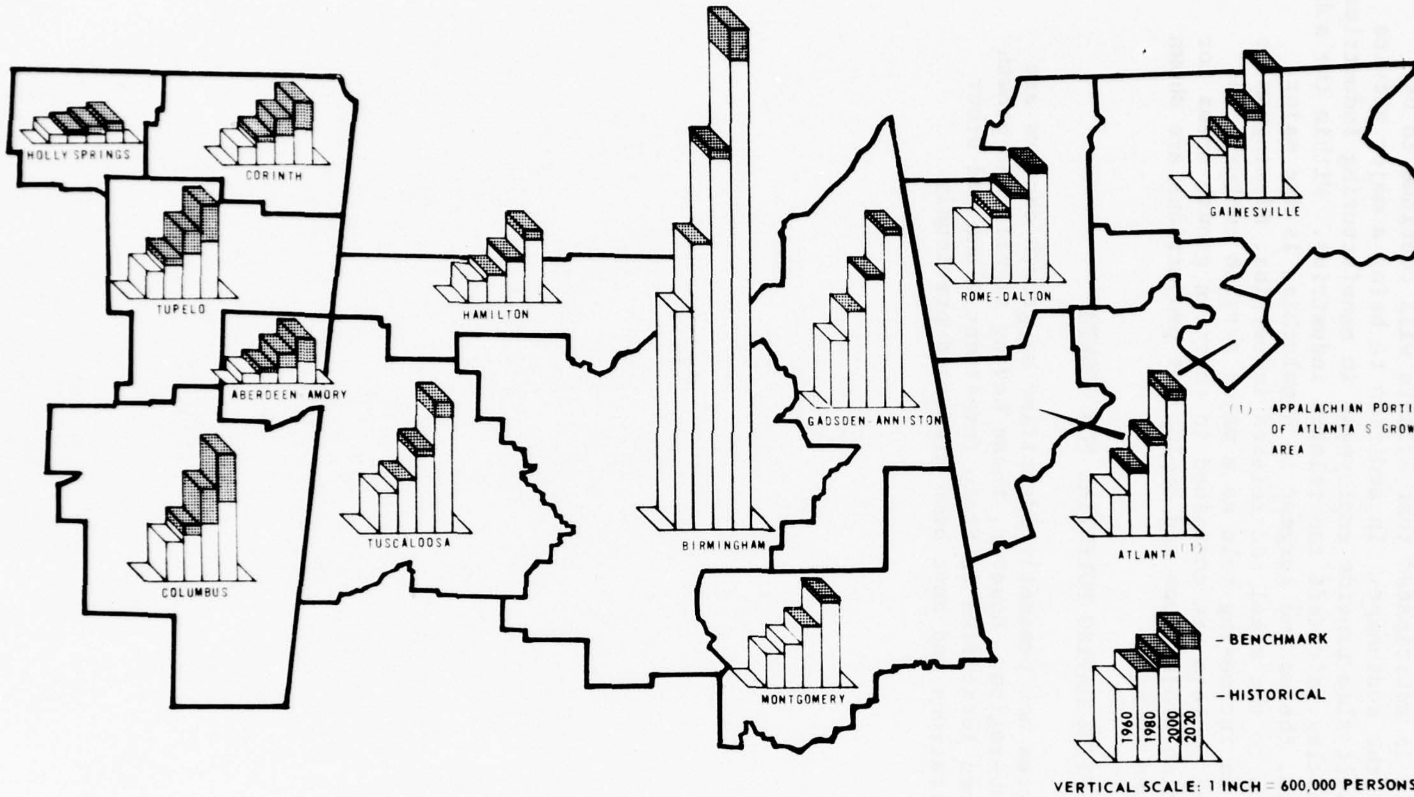

FIGURE 10-5 WATER SUB-REGION E GROWTH AREA POPULATION PROJECTIONS

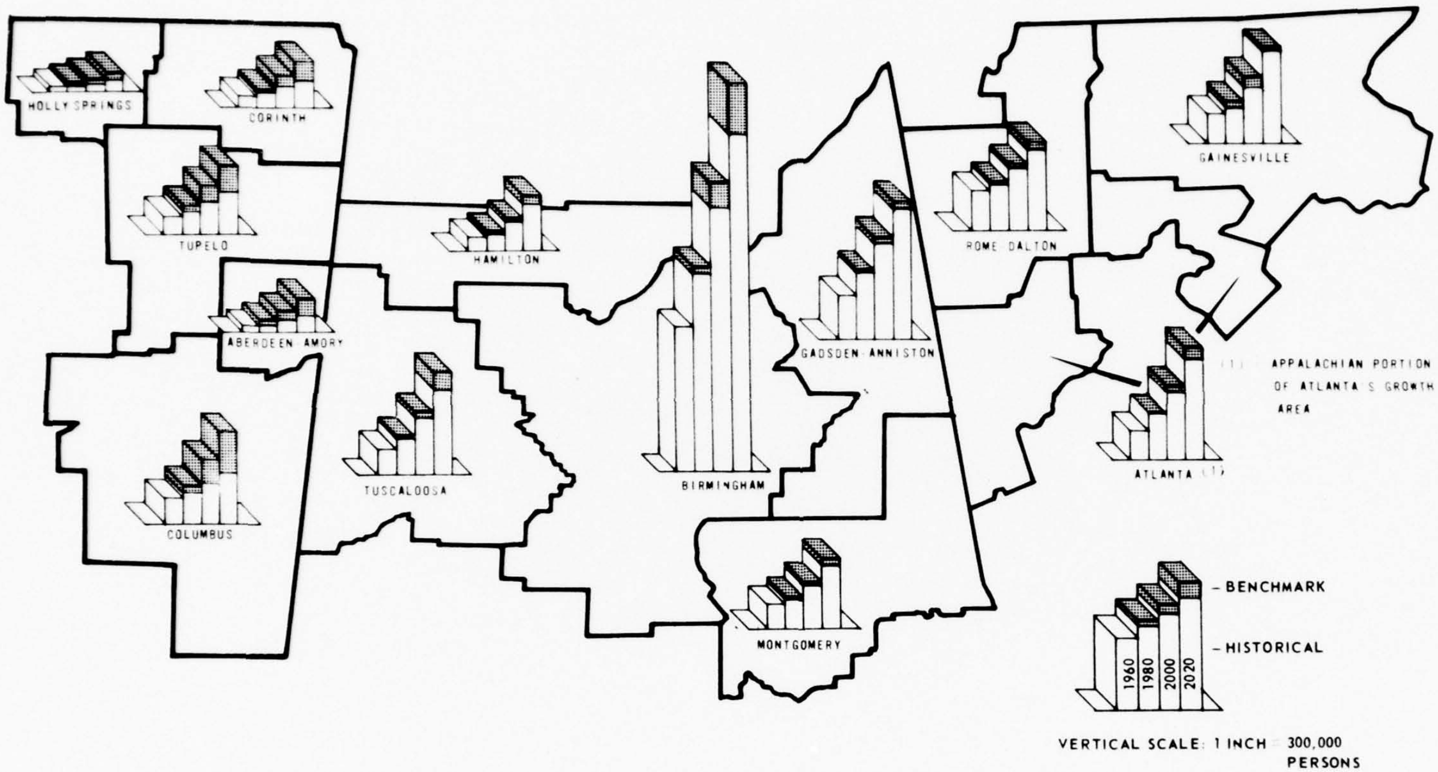

FIGURE 10-6 WATER SUB-REGION E GROWTH AREA EMPLOYMENT PROJECTIONS

SECTION II - WATER RELATED NEEDS

6. INTRODUCTION

The analysis of water needs in the context of the developmental objectives of PL 89-4 is based on several considerations. These include:

a. Immediate needs;

b. The needs that result from the continued development of Water Sub-region E and contiguous areas, with a normal water development program; and,

c. The needs that will result from accelerated development that is generic to development of any economy within the full capacity of the area to supply industrial sites, provide labor, developmental capital, and other needs.

The latter aspect has been approached by the setting of the benchmarks for population, employment, and income. These higher planning goals reflect potential more than historical trends.

From the socio-economic analysis of the region and the overlay of the benchmark projections a judgment of the developmental impediments associated with water resource management has evolved. The procedure used to make this judgment was to spatially locate the benchmark projection on the sub-region. This process is by the way of successive disaggregation of the projections from larger to smaller areas. Of course, error limits increase as the process narrows the projections to smaller areas. This is an inherent risk associated with long-range planning, but the validity of the analysis can be improved by design of greater flexibility into project recommendations and by hedging future needs by the way of staged construction.

Water resources planning is dominated by the hydrologic delimitation of space. Since water can be reused many times on its way to the sea or back to the atmosphere, the regions delimited for economic analysis were overlain on watersheds for the derivation of water needs. Benchmark projections were allocated (by the disaggregation procedures) to state planning sub-regions thence to river basins. If the analysis indicates a new set of water problems or water related impediments to the attainment of the developing region to its potential, these problems or impediments become the needs against which water management proposals would be designed.

7. WATER RESOURCE NEEDS IN THE SUB-REGION

<u>The Problems in General</u>

The water and related land use problems of the sub-region are largely concerned with flood control, navigation, land conservation and

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development, water supply, maintenance of stream quality, power and recreation. Other needs related to irrigation, drainage, stream bank erosion and sedimentation do exist or possibly will occur but, with proper planning for other water-use improvements, are not expected to be inhibiting factors to economic growth and development of the sub-region in the foreseeable future. For this section of the report, the term "needs" differs in some respects from the ordinary usage in water resource planning in that it refers to the projected demand less the supply provided by existing developments and those expected to be constructed by 1980. Estimates of the needs on that basis are presented for the sub-region as a whole with the growth center needs being identified, insofar as possible, to include the needs for the local area influenced by each center.

Flood Control

Rural and urban developments throughout the sub-region are subject to damaging floods. Over three-fourths of a million acres of land along the main streams and the principal tributaries are flooded, in addition to lands along the smaller streams and in the upstream watersheds, many as often as two or more times each year. The more serious flood problems exist in the growth areas of Dalton-Calhoun and Rome in Georgia; Gadsden-Anniston, Birmingham and Tuscaloosa in Alabama; and, Columbus, Mississippi. In view of their expected continued growth, these are also the areas with the greatest potential future flood damages. Floods along the Conasauga and Oostanaula Rivers in the Dalton-Calhoun and Rome growth areas damage urban and agricultural development. The latter city is also affected by floods on the Etowah and Coosa Rivers because of its location at the junction of the Oostanaula and Etowah Rivers where the Coosa is formed. Urban development is also damaged at Cedartown on Big Cedar Creek and Cave Spring on Little Cedar Creek which are tributaries of the Coosa River. To the west in Alabama the major problems in the Gadsden-Anniston growth center result from floods on the Coosa River at Gadsden and Childersburg. In the Birmingham growth area, the more critical existing and potential future flood problems are along Shades Creek, a tributary of the Cahaba River, and along Valley and Village Creeks, tributaries of the Locust Fork of the Black Warrior River, as well as several smaller streams. The principal problems in the Tuscaloosa area are along the Black Warrior River below Holt Lock and Dam in and adjacent to Tuscaloosa and the adjoining urban center of Northport. Agriculture is also damaged farther downstream along the river below these industrialized urban centers. Farther to the west in Mississippi in the Columbus growth area the principal concentration of flood damages is at and in the vicinity of the city where urban development is periodically inundated by the Tombigbee River and its tributary, Luxapalila Creek. Rural flood damages in Mississippi, for the greater part, are distributed along tributaries of the Tombigbee River such as the Tibbee River and Chookatoonchee (also referred to in this and other report components as Chuquatonchee and Sakatonchee), Line and Catalpa Creeks and in their upstream watersheds. These agricultural

damages are of significance, for one reason, because they affect the economy of urban centers which to a large extent are dependent upon trade from the surrounding rural areas.

Developments on flood plain lands of the sub-region now sustain total damages averaging over $17.7 million annually. Rural damages account for about 89 percent of this total; the remaining 11 percent is in urban areas. Considering flood control projects presently proposed for construction prior to 1980 under authorities other than the Appalachian water resources program, flood damages in the sub-region are expected to be reduced by about $5,923,000. With these projects in operation and giving consideration to the known flood damage reduction resulting from the development of Appalachian projects, residual flood damages would be approximately $8,566,000, based on 1968 prices and development. Data on flood damages in the sub-region; the effect of known programs in 1980; and, the effect of planning alternatives are given in Table 10-1. Estimates of residual urban flood damage by growth center are presented in Table 10-11. With the flood control improvements included in the plan for the sub-region and the implementation of flood plain management techniques, the residual damages could be maintained at levels which would not be a major impediment to the future growth and economy.

Flood scene - right bank of Tombigbee River at Columbus, Mississippi

TABLE 10-1
FLOOD DAMAGE IN SUB-REGION E

Stream, Tributary or Watershed	Major stream, principal tributary or watershed: Stream mile From	To	Estimated damage $1,000 - 1968: Rural	Urban	Total	Effect of known programs — Damage Reduction by 1980 and Residual, $1,000: Project	Total	Reduced	Residual	Effect of planning alternatives — Damage Reduction and Residuals $1,000: Project	Total	Reduced	Residual
CHATTAHOOCHEE RIVER BASIN													
Sautee Creek					5	Watershed, existing			5	None			5
Soque River					86	Watershed	86	68	18	None			18
Hazel Creek					4	Watershed, existing			4	None			4
Chattahoochee River	419.0	390.0	6	0	6	None			6	None			6
Tesnatee Creek					40	Watershed	40	27	13	None			13
Wahoo-Little River					29	None			29	Watershed	29	22	7
Chattahoochee River	390.0	312.8	5	0	5	Buford Res., existing			5	Roswell Res.	5	2	3
Suwanee Creek					58	Watershed	58	53	5	None			5
Chattahoochee River	312.8	236.0	12	0	12	Buford Res., existing			12	Newnan Res.	12	5	7
Chattahoochee River	236.0	201.0	48	0	48	West Point Res.	48	24	24	None			24
Wehadke Creek					9	None			9	Watershed	9	7	2
Chattahoochee River	201.0	190.0	4	162	166	West Point Res.	166	166	0	Newnan Res.			0
TOTAL FOR CHATTAHOOCHEE RIVER BASIN RIVER					468			338	130			36	97
ALABAMA-COOSA RIVER BASIN													
Jacks River					None	Watershed, existing			None				
Mill Creek Area					30	None			30	Watershed	30	25	5
Mill Creek					9	Watershed, existing			9	None			9
Conasauga River	70.0	0.0	299	0	299	None			299	Dalton Res.	299	85	214
Cartecay River					20	Watershed	20	18	2	None			2
Ellijay River					33	Watershed	33	26	7	None			7
Mountaintown Creek					18	Watershed	18	15	3	None			3
Talking Rock Creek					23	Watershed	23	17	6	None			6
Sallacoa Creek					70	Watershed	70	70	0 a	None			a
Pinelog Tributary					70	Watershed	70	70	0 b	None			b
Coosawattee River	26.8	0.0	39	0	35	Carters Res., existing			39	None			39
Johns Creek					32	Watershed	32	27	5	None			5
Armuchee Creek					51	Channel Imp., existing			51	None			51
Oostanaula River	47	0.0	173	21	194	Carters Res., existing			194	Dalton Res.	194	44	150
SUB-TOTAL - OOSTANAULA RIVER PORTION					888			243	645			154	491
Etowah River Reach					76	Watershed	76	65	11	None			11
Amicalola Creek					1	Watershed, existing			1	None			1
Settingdown Creek					4	Watershed, existing			4	None			4
Long Swamp Creek					52	Watershed	52	45	7	None			7
Etowah River	100.0	90.5	18	0	18	None			18	Gilmer	18	18	0
Sharp Mountain Creek					65	Watershed	65	58	7	None			7
Mill-Canton Creek					38	Watershed	38	31	7	None			7
Etowah River	90.5	73.6	28	30	58	None			58	Gilmer	58	45	13
Little River					74	Watershed	74	71	3	None			3
Noonday Creek					18	Watershed	18	11	7	None			7
Stamp-Shoal Creek					14	Watershed	14	13	1	None			1
Allatoona Creek					5	Watershed	5	4	1	None			1
Etowah River	47.9	0.0	15	28	43	Allatoona Res., existing			43	Gilmer	43	0	43
Pumpkinvine Creek					52	Watershed	52	47	5	None			5

TABLE 10-1 (Cont'd)
FLOOD DAMAGE IN SUB-REGION E

Stream, Tributary or Watershed	Major stream, principal tributary or watershed: Stream mile From	To	Estimated damage $1,000 - 1968: Rural	Urban	Total	Effect of known programs, Damage Reduction by 1980 and Residual, $1,000: Project	Total	Reduced	Residual	Effect of Planning Alternatives, Damage Reduction and Residuals $1,000: Project	Total	Reduced	Residual
ALABAMA-COOSA RIVER BASIN (Cont'd)													
Raccoon Creek					46	Watershed	46	38	8	None			8
Euharlee Creek					74	Watershed	74	48	26	None			26
SUB-TOTAL - ETOWAH RIVER PORTION					638			431	207			63	144
Big Cedar Creek					56	Watershed	56	52	4	None			4
Little Cedar Creek			4	28	32	Channel imp.	32	12	20	None			20
Coosa River	287.7	255.2	85		85	Weiss Res. existing			85	Dalton Res.			85
Headwaters Chattooga River[c]					65	None			65	Watershed [c]	65	50	15
Mill Creek					31	None			31	Watershed	31	24	7
Terrapin Creek					173	Watershed	173	93	80	None			80
Little Cove Creek					0	Channel imp., existing			0	None			0
Black Creek				15	15	Channel imp., existing			15	None			15
Blue Eye Creek					22	Watershed	22	16	6	None			6
Choccolocco Creek					228	Watershed	228	194	34	None			34
Cheaha Creek					50	Watershed	50	40	10	None			10
Goose Pond, Poley Bridge and Walnut Creeks					8	Channel imp., existing			8	None			8
Jacks and Socapotay Creeks					d				d	Watershed			d
Coosa River	255.2	0.0	280	62	342	Weiss, Henry, Logan, Lay, Mitchell and Jordan Dam, existing			342	None			342
SUB-TOTAL - COOSA RIVER PORTION					1,042			407	635				611
Little River					29	Watershed	29	25	4	None			4
Cahulga Creek					12	Watershed	12	10	2	None			2
Dyne Creek					14	None			14	Watershed	14	12	2
Ketchepedrake Creek					34	Watershed	34	29	5	None			5
Little Tallapoosa River					88	Watershed	88	84	4	None			4
Lower Little Tallapoosa River					95	Watershed	95	83	12	None			12
Lost Creek					10	Watershed	10	7	3	None			3
Crooked Creek					14	Watershed	14	12	2	None			2
High Pine Creek					21	Watershed, existing			21	None			21
Tallapoosa River	137.7	92.0	94		94	None			94	Crooked Cr. Res.[e]	94	4	0
Tallapoosa River	49.7	0.0	69		69	Martin, Yates and Thurlow Dams, existing			69	Crooked Cr. Res.	69	0	69
SUB-TOTAL - TALLAPOOSA RIVER PORTION					480			250	230			106	124
Mill Creek					0	Watershed, existing			0	None			0
Alabama River	314.4	245.4	56	f	56	None			56	None			56
Pinchgut Creek and Cahaba River					7	Channel imp., existing			7	None			7
Shades Creek	52.0	0.0	40	232	272	None			272	Channel imp.	272	undetermined	272
Mahan Creek					11	None			11	Watershed	11	9	2
Cahaba River	79.2	64.8	31	83	114	None			114	Centerville Res.	114	undetermined	114
SUB-TOTAL - *ALABAMA AND CAHABA PORTION*					460			0	460			9	451
TOTAL FOR ALABAMA-COOSA RIVER BASIN					3,508			1,331	2,177			356	1,821

TABLE 10-1 (Cont'd)
FLOOD DAMAGE IN SUB-REGION E

Stream, Tributary or Watershed	Major stream, principal tributary or watershed: Stream mile From	To	Estimated damage $1,000 - 1968: Rural	Urban	Total	Effect of known programs, Damage Reduction by 1980 and Residual, $1,000: Project	Total	Reduced	Residual	Effect of Planning Alternatives, Damage Reduction and Residuals $1,000: Project	Total	Reduced	Residual
BLACK WARRIOR RIVER BASIN[g]													
Bristows Creek					1	Watershed, existing			1	None			1
Locust Fork	431.8	400.0	22	34	56	Smiths Ford Res. existing[g]			56	Smiths Ford Res.	56	56	0
Mulberry Fork	446.0	410.0	18	5	23	None			23	Arkadelphia Res.	23	16	7
Black Warrior River	400 L.F. 410 M.F.	373.6	38	-	38	L. M. Smith, Smiths Ford[g] and Holt Reservoirs, existing			38	Smiths Ford and Arkadelphia Res.	38	undetermined	38
Little Sandy Creek					3	None			3	Watershed	3	3	0
Black Warrior River	373.6	303.0	570	485	1,055	L. M. Smith, Smiths Ford[g] and Holt Reservoir, existing			1,055	Smiths Ford, Arkadelphia, and Levee System	1,055	485[h]	570
TOTAL FOR BLACK WARRIOR RIVER BASIN					1,176			0	1,176			560	616
TOMBIGBEE RIVER BASIN													
Brown Creek					231	Watershed	231	153	78	None			78
Little Brown Creek					9	Channel imp.	9	6	3	None			3
Big Brown Creek					13	Channel imp., existing			13	None			13
Donivan Creek					8	Channel imp., existing			8	None			8
Twenty Mile Creek					47	Channel imp., existing			47	None			47
Matachie Creek					17	Channel imp., existing			17	None			17
Stanefer Creek					6	Channel imp., existing			6	None			6
East Fork	513.0	446.0	719		719	None			719	None			719
Old Town Creek					743	Watershed	743	498	245	None			245
Chiwapa Creek					360	Watershed	360	275	85	None			85
West Fork					8	Channel imp.	8	6	2	None			2
James Creek					16	Channel imp., existing			16	None			16
Tombigbee River	446.0	387.0	91	6	97	Tenn-Tom Waterway			97	None			97
Sipsey Creek					190	None			190	Watershed	190	101	89
Buttahatchie River	69.0	0.0	157		157	Channel imp.	157	75	82	Hamilton Res.	82	undetermined	82
Chuquantonchee Creek					389	Watershed	389	170	219	None			219
Houlka Creek					382	Watershed	382	192	190	None			190
Line Creek					184	Watershed	184	138	46	None			46
Tibbee River and Tributaries					632	Channel imp.	632	366	266	None			266
Luxapalila Creek					44	None			44	Watershed	44	31	13
Luxapalila Creek	17.2	0.0	70	278	348	Channel imp.	348	271	77	Yellow Cr. Res.	77	undetermined	77
Tombigbee River	387.0	341.7	149	285	434	None			434	Levee System	434	150	284
Tombigbee River	341.7	300.4	85		85	Tenn-Tom Waterway		undetermined	85	None			85
Little New River					5	Watershed, existing			5	None			5
Sipsey River	124.0	0.0	79		79	Channel imp.	79	42	37	None			37
Noxubee River	106.0	24.0	66		66	Channel imp.	66	24	42	None			42
Shammack Creek					3	Watershed, existing			3	None			3
Other upstream watershed areas[i]					4,493	None			4,493	Watershed	4,493	1,948	2,545
TOTAL FOR TOMBIGBEE RIVER BASIN					9,765			2,216	7,549			2,230	5,319

TABLE 10-1 (Cont'd)
FLOOD DAMAGES IN SUB-REGION E

Stream, Tributary or Watershed	Major stream, principal tributary or watershed: Stream Mile From	To	Estimated damage $1,000 - 1968: Rural	Urban	Total	Effect of known programs, Damage Reduction by 1980 and Residual, $1,000: Project	Total	Reduced	Residual	Effect of Planning Alternatives, Damage Reduction and Residuals $1,000: Project	Total	Reduced	Residual
OTHER RIVER BASIN AREAS													
SAVANNAH RIVER TRIBUTARIES													
North Fork Broad River					6	Watershed, existing			6	None			6
North Broad River					25	Watershed	25	22	3	None			3
Middle Fork Broad River					17	Watershed	17	13	4	None			4
Hudson River					153	Watershed	153	128	25	None			25
Grove River					65	Watershed	65	63	2	None			2
SUB-TOTAL - SAVANNAH RIVER PORTION					266			226	40				40
ALTAMAHA-OCONEE RIVER BASIN													
Hayes Creek-Brushy Fork					14	Watershed	14	14	0	None			0
TENNESSEE RIVER TRIBUTARIES													
Hiwassee River					9	Watershed	9	7	2	None			2
Hightower Creek					3	Watershed, existing			3	None			3
Head of Little Tennessee River					28	Watershed	28	17	11	None			11
Young Cane Creek					21	None			21	Watershed	21	17	4
SUB-TOTAL - TENNESSEE RIVER BASIN					61			24	37			17	20
HATCHIE RIVER TRIBUTARIES													
Hatchie and Tuscumbia Rivers			105		105	None			105	Hatchie R. Res.	105	18	87
Tuscumbia Creek					542	Watershed	542	367	175	None			175
West Hatchie Creek					128	Watershed	128	123	5	None			5
Muddy Creek					255	Watershed	255	237	18	None			18
Grays Creek					119	Watershed	119	107	12	None			12
SUB-TOTAL - HATCHIE RIVER PORTION					1,149			834	315			18	297
COLDWATER AND LITTLE TALLAHATCHIE RIVERS													
Hell Creek					53	Watershed	53	45	8	None			8
Cane Creek					26	Watershed	26	15	11	None			11
Upper Tippah Creek					4	Watershed	4	3	1	None			1
North Tippah Creek					30	Watershed	30	21	9	None			9
Lower Tippah Creek					193	Watershed	193	157	36	None			36
Okalimeter Creek					120	Watershed	120	116	4	None			4
Mill Creek					40	Watershed	40	26	14	None			14
Little Spring-Ochewalla Creek					47	Watershed	47	21	26	None			26
Pigeon Roost Creek					227	Watershed	227	93	134	None			134
Coldwater and Tallahatchie Rivers					248	Watershed	248	203	45	None			45
Ducan Cane Creek					37	Watershed	37	34	3	None			3
Locks Creek					31	Watershed	31	18	13	None			13
Cypress and Puss Cuss Creek					50	Watershed	50	34	16	None			16
SUB-TOTAL - COLDWATER AND LITTLE TALLAHATCHIE RIVER PORTION					1,106			786	320				320

TABLE 10-1 (Cont'd)
FLOOD DAMAGE IN SUB-REGION E

Stream, Tributary or Watershed	Major stream, principal tributary or watershed: Stream Mile From	To	Estimated damage $1,000 - 1968: Rural	Urban	Total	Effect to known programs: Damage Reduction by 1980 and Residual, $1,000: Project	Total	Reduced	Residual	Effect of Planning Alternatives: Damage Reduction and Residuals $1,000: Project	Total	Reduced	Residual
BIG BLACK AND PEARL RIVERS													
Big Black River	280	255	22		22	None			22	None			22
Upper Skuna River					72	Watershed	72	71	1	None			1
Fair Creek					6	Watershed	6	6	0	None			0
Tallahoga Creek					91	Watershed	91	77	14	None			14
SUB-TOTAL - BIG BLACK AND PEARL RIVERS PORTION					191			154	37			0	37
TOTAL FOR OTHER RIVER BASIN AREAS					2,787			2,038	749			35	714
TOTAL FOR SUB-REGION E					17,704			5,923	11,780			3,216	8,567

a. Project effects extend outside the watershed for additional damage reduction of $11,000.

b. Project effects extend outside the watershed for additional damage reduction of $38,000

c. Project and flood damage areas primarily located in water sub-region J.

d. Flood damage not evaluated.

e. Assumes private development in accordance with Corps recommendations to FPC.

f. Outside Appalachia in City of Montgomery, annual urban damages of $311,000 will be reduced by $293,000 with the authorized levee system.

g. Damage reduction based on 233,000 acre feet of flood control storage which is deemed the minimum storage desirable.

h. Effects of Levee System only, since Arkadelphia effects do not reach this far downstream and standard project flood storage effects of Smiths Ford site have not been evaluated.

i. Total for 27 watershed areas as reported in Appendix A for Tombigbee River basin.

Navigation

All of the major rivers and some of the smaller streams of the sub-region have, in the past, served as arteries for commercial transportation. Only three, however, were ever improved by the construction of locks for commercial navigation; the Coosa, Black Warrior and Tennessee Rivers. The improvements on the Coosa River were limited to facilities for local traffic of shallow draft. They were subsequently made obsolete by the improved highways that were constructed and the expanding railroad system and were later abandoned. On the other hand, the Black Warrior River navigation project constructed in the early 1900's, the uppermost segment of the Black Warrior and Tombigbee River Waterway which connects western Alabama and the Birmingham industrial complex with the deep-water port of Mobile, Alabama, has constantly been improved and modernized to keep pace with its growing use. Traffic over the waterway has increased steadily, especially since World War II; in 1966, 8.2 million tons of commodities moved over the waterway including 5.6 million tons over the Black Warrior segment. Modernization of this waterway was initiated in the latter 1930's with the construction of the William Bacon Oliver Lock and Dam on the Black Warrior River at Tuscaloosa, Alabama. This program will be completed with the construction of a new lock at John Hollis Bankhead Dam, the uppermost navigation structure on the Black Warrior near Birmingham, which is now in the advance planning stage. The William Bacon Oliver Lock and Dam will have served its useful life about 1988. This lock has a chamber width of 95 feet and length of 460 feet. All of the remaining locks included in the modernization program have, or will have with the replacement of the Bankhead Lock, dimensions of 110 by 600 feet. With the present trend of increasing traffic which is expected to continue, the Oliver Lock will become a bottleneck after the new Bankhead Lock is completed.

It is estimated that nearly 16 million tons of commodities are presently available for movement annually over the Black Warrior portion of the Black Warrior and Tombigbee Waterway, the Tennessee-Tombigbee Waterway, the authorized waterway on the Coosa River and a potential waterway on the Chattahoochee River from Columbus, Georgia, to Atlanta. This commerce is projected to increase to over 28.5 million tons annually by 1980, of which about 9.7 million would be over the Black Warrior River and nearly 14.8 million over the Tennessee-Tombigbee Waterway. Of the remaining approximately 4.1 million tons, it is estimated that 2.3 million tons would be available for movement over the Coosa River Waterway, and 1.8 million tons over the Chattahoochee River. The projected annual tonnages for these existing, authorized and poential waterways are given in Table 10-2. These projections do not reflect the increase in traffic which could be expected with the stimulus provided by the Appalachian program.

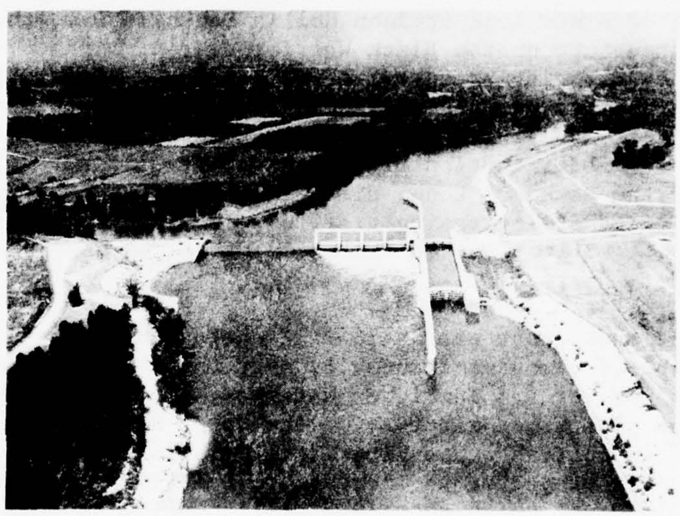
More than 20 million tons of traffic moves annually on the Tennessee River system, a substantial amount of which moves through Pickwick Lake which borders the sub-region on the northwest. Investment

in industrial plants along the waterway now exceeds $1.5 billion, but no industrial investment has occurred on the waterway in the sub-region.

TABLE 10-2

PROJECTED ANNUAL COMMERCE OVER EXISTING AND POTENTIAL WATERWAYS OF SUB-REGION E

Waterway	Annual Commerce in 1,000 Tons 1980	2000	2020
Black Warrior River	9,672	13,947	20,224
Tennessee-Tombigbee	14,755	22,922	35,485
Coosa River	2,302	5,187	10,296
Chattahoochee River - Columbus to Atlanta, Georgia	1,800	3,386	4,569
Total	28,529	45,442	70,574



Modern Lock on Chattahoochee River of the type authorized for the Tennessee-Tombigbee and Coosa River Waterways.

Watershed Land Management

Watershed land management problems of the sub-region have been identified by the USDA as being changes needed in present land use and the

application of needed conservation treatment for proper use of the lands.

The principal conservation problems for cropland are erosion and drainage. By 1980, about 1,376,000 acres of cropland will require measures for erosion control to reduce and retard runoff and resultant soil losses. About 591,500 acres of cropland will require drainage of excess water.

Pastureland treatment needs by 1980 include new seeding of about 1,215,500 acres and improvement of the vegetative cover on another 694,200 acres. About 700,200 acres will need protection from overgrazing and invasion of undesirable plants.

Some of the major conservation needs for forest and woodland that are anticipated by 1980 include establishment of timber stands on 4,549,900 acres, proper cutting and logging practices on 2,112,400 acres, hydrologic stand improvement on 4,549,900 acres, and protection of 1,625,000 acres from grazing by domestic livestock. In some areas, small privately-owned tracts are located within the periphery of public forest boundaries. USDA, in Appendix A, suggests that these tracts be acquired by state, Federal or local governmental agencies to consolidate the public forest lands where development and improvement of the small tracts is not feasible or cannot otherwise be anticipated.

Other conservation needs can also be expected by 1980. These include the conversion of 278,100 acres of cropland to less intensive use, such as pasture, woodland and wildlife, the stabilization of about 45,350 acres of eroding roadbanks on public rights-of-way, and treatment of 2,110 acres of surface mined areas.

The land use acreage that will be needed to support planned and anticipated development in the sub-region by 1980 is given below and is tabulated for the growth centers in Table 10-3.

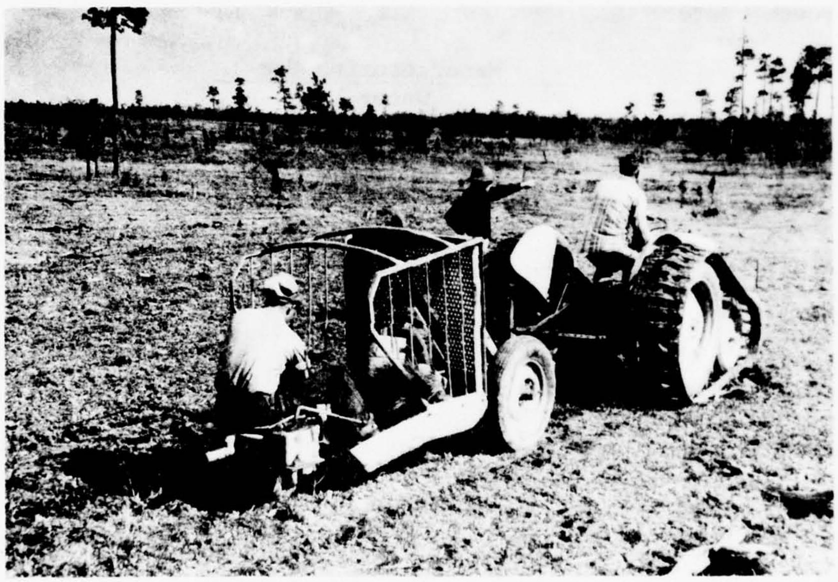
Land Use Category	Land Use in Acres: 1958	Land Use in Acres: Needed by 1980
Cropland	3,702,500	3,275,600
Pasture	2,115,700	2,821,400
Forest and woodland:		
State and private	15,022,700	14,941,900
National Forests	1,195,900	1,307,600
Other Land	1,310,000	557,100
Nonagricultural	1,023,400	1,484,600
Total	24,370,200	24,388,200

TABLE 10-3

LAND DEVELOPMENT NEEDS AND ALTERNATIVES BY GROWTH CENTER
WATER SUB-REGION E

Growth Centers	Urban land needs: Total acres	Urban land needs: Flood Plain acres	Area protected to a minimum of 100 years recurrence interval
GEORGIA:			
Toccoa-Cornelia-Clarksville	5,450	180	
Dahlonega	980	-	
Gainesville	7,480	180	
Douglasville	3,790	-	
Dalton-Calhoun	8,700	370	
Rome	7,980	850	
Cartersville	3,280	20	
Cedartown-Rockmart	3,250	180	
Summerville	5,360	20	
Carrollton-Bremen	3,520	90	
Villa Rica	690	-	
ALABAMA:			
Gadsden	13,980	550	
Anniston	13,700	780	
Talladega	7,990	930	
Wetumpka (Elmore County)	2,990	20	
Birmingham	78,200	1,870	
Tuscaloosa	12,450	760	50 ac. - Potential levee system (both banks of Black Warrior River)
Fayette-Vernon-Hamilton	6,330	160	
MISSISSIPPI:			
Pontotoc-Tupelo-Fulton	9,490	580	
Amory-Aberdeen	4,450	130	
Columbus-Starkville-West Point	11,540	1,270	900 ac. - Potential levee system (left bank *Tombigbee River*)
Corinth-Booneville-Iuka	7,400	410	
Holly Springs	2,950	-	
TOTAL	221,950	9,350	

The demand for land for industrial, commercial and urban residential site development in the sub-region is projected to be 74,200, 108,400 and 129,100 acres during each of the 20-year periods 1960-80, 1980,2000 and 2000-20, respectively. The total 311,700 acres required for development represents a 165-percent increase of the present area in urban use. The acreages needed for urban development are based on population and employment projections (Benchmarks, see Section I of this chapter) and allow 24 workers per acre for manufacturing, 10 per acre for transportation, 30 per acre for trades and 150 per acre for services. Analysis indicated sufficient land of suitable gradient and location will be available for this scale of development



Beginning of a New Forest (U.S. Forest Service Photo)

Water Supply

Current and projected water supply "demand" estimates for Sub-region E are given in Table 10-4. Water supply "needs" (the increment of "demand" over the available 1980 supply) are also given in the same table and are shown graphically in Figure 10-7.

Table 10-4 shows that the estimated daily demand on municipal water supply systems in 1960 was about 450 mgd, and the total manufacturing intake was 583 mgd with about 201 mgd being furnished by municipal water supply systems. By the year 2020, it is estimated that the total daily demands on municipal water supply systems of the sub-region will be 2,160 mdg, and the total manufacturing use will be about 2,807 mgd with about 1,009 mgd being a part of the

total 2,160 mgd municipal water system demand. This sub-regional demand will require a higher degree of runoff regulation, but with the annual runoff from the area (34,000 mgd) the additional regulation needed could be readily accomplished. The estimated growth center water supply needs as presented later in this chapter, in the total amount, is generally consistent with the estimates by the Federal Water Pollution Control Administration in Appendix D. They may differ somewhat, however, on an individual growth center basis because of variation in the basic assumptions including the degree or urbanization anticipated, the geographical extent of municipal water supply systems, the magnitude of water use per capita or per unit of manufacturing output and other factors. The following is an example of the estimates derived for this report for the Dalton-Calhoun, Georgia, growth center:

	Domestic Use			Manufacturing Use				
Year	Pop a/	Gallons Per Capita Per Day b/	Use (Mgd)	Manuf. Employment c/	Water Use Per Employee (GPD)	Use (MGD)	Municipal Use (MGD) d/	Gross Demand (MGD) e/
1960	71.8	100	7.2	6,750	4,500	30.4	37.6	68.0
1980	94.0	125	11.8	8,840	6,000	53.0	64.8	117.8
2000	134.7	150	20.2	12,660	7,500	95.0	115.2	210.2
2020	179.6	175	31.4	16,880	9,000	151.9	183.3	335.2

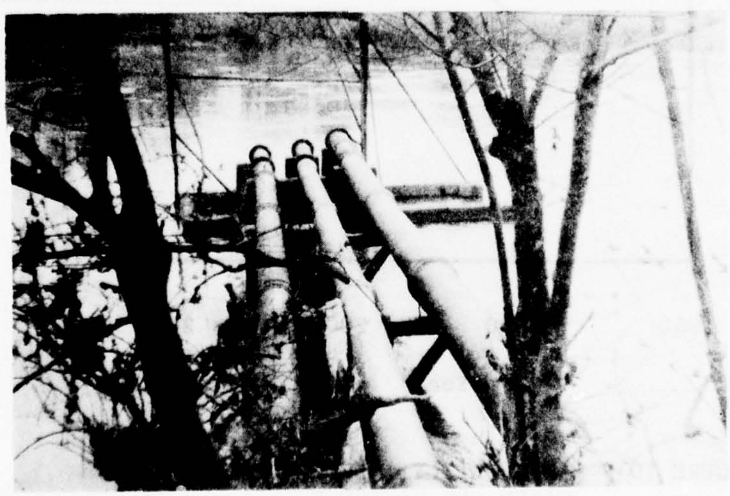
a/ Whitfield, Murray and Gordon Counties, actual and projected.
b/ Corps of Engineers, Mobile District planning standard.
c/ Employment adjusted to reflect the percentage of employment associated with municipal supplies in the area.
d/ Average daily use for which conveyance systems are needed.
e/ Consist of manufacturing use to be provided by private development and the municipal use requirements.

According to the 1967 Conservation Needs Inventory (USDA), nearly one out of every three watersheds in the Nation has municipal and industrial water supply problems. The 11 watersheds investigated by the Soil Conservation Service and Forest Service for Appalachia indicated that similar problems exist in two such areas in Water Sub-region E as follows:

Location No.	Watershed	Counties	State
34	Luxapalila Creek	Fayette, Lamar, Marion and Pickens in Alabama and Lowndes in Mississippi	Alabama and Mississippi
62	Wahoo-Little River	Hall, Lumpkin and White	Georgia

The above discussed demand values suffice to indicate the magnitude of the water needs on a sub-regional basis. For planning purposes, however, a more detailed analysis was required which reflected the spatial distribution and availability of ground and surface water supplies. This analysis related the estimate of gross water needs by growth centers to the supply which could reasonably be expected to be available as a source of potable water to each growth center by 1980. A judgment of both quality and quantity availability was necessary for this analysis. Both factors were introduced as constraints on available supply and the difference between gross needs and available supplies were then computed to obtain the magnitude of additional water supply sources which should be developed to reach the regional development objectives.

Table 10-5 presents the estimated gross demand for water by growth centers in 1980, 2000 and 2020. In Table 10-6, the increment between gross demand in 2020 and the dependable supply expected to be available in 1980 is referred to as needs unless otherwise qualified in Section III, paragraph 10 of this chapter. Table 10-7 presents a summary of water supply needs and alternatives. Table 10-8 presents the relative costs associated with the development of ground water supplies and surface impoundments for the magnitude needs shown in Table 10-7. The cost comparisons are necessarily oversimplified, because the transmission costs are variable depending upon location and are therefore omitted, but the comparisons do serve to indicate the competitiveness of ground water sources with surface impoundment at the levels of need anticipated.



RAW WATER INTAKE - CHATTAHOOCHEE RIVER, GEORGIA

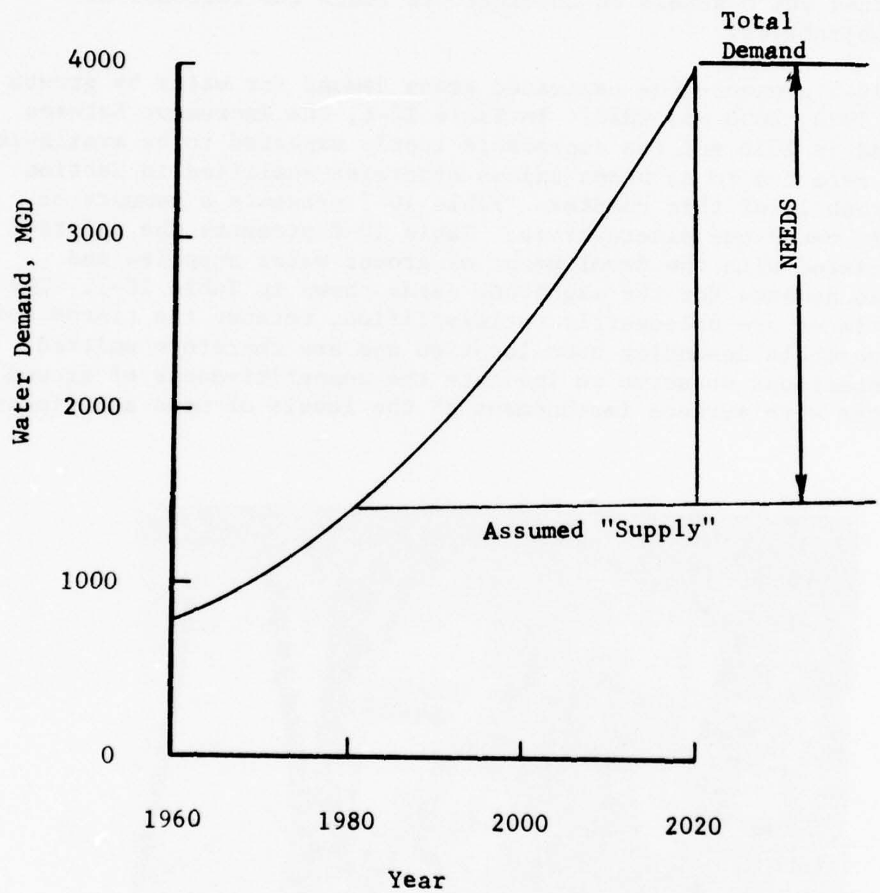


FIGURE 10-7 WATER SUPPLY, "DEMAND" AND "NEEDS"
WATER SUB-REGION E

TABLE 10-4

ESTIMATED GROSS WATER DEMANDS AND NEEDS
FOR SUB-REGION E (MGD)

	Gross Manufacturing Demands							
	From Company Systems[a]			From Mun.		Domestic[b]		
Year	Surface	Ground	Total	Systems	Total	Intake	Total	Needs[c]
1960	360	22	382	201	583	249	832	0
1980	630	33	663	354	1,017	430	1,447	0
2000	1,070	60	1,130	625	1,755	729	2,484	1,037
2020	1,710	88	1,798	1,009	2,807	1,151	3,958	2,511

a. Based on 1966 waste discharge by major manufacturers; the distribution between surface and ground water sources assumes the 1966 relationship will remain constant.

b. Per capita consumption estimated at 100 mgd in 1960; 125 mgd in 1980; 150 mgd in 2000; and, 175 mgd in 2020, based on knowledge of present water use in the sub-region and projected on past trends.

c. Increment between 1980 and 2020 demand.

TABLE 10-5

ESTIMATED GROSS DEMAND FOR WATER SUPPLY
IN MGD FOR GROWTH CENTERS IN WATER
SUB-REGION E

Item	1980	2000	2020
GEORGIA:			
Chattahoochee River Basin			
Dahlonega	2	3	5
Gainesville	13	26	45
Atlanta [a]	315	725	1,225
Douglasville	5	10	19
Other River Basin Areas			
Toccoa-Cornelia-Clarksville	10	20	35
Alabama-Coosa River Basin			
Dalton-Calhoun	118	210	335
Rome	43	74	116
Cartersville	7	13	23
Cedartown-Rockmart	7	13	23
Summerville	5	11	19
Villa-Rica	2	4	6
Carrollton-Bremen	12	20	29
ALABAMA:			
Alabama-Coosa River Basin			
Gadsden	158	228	341
Anniston	24	43	76
Talladega	37	63	99
Wetumpka	12	21	34
Black Warrior River Basin			
Birmingham	597	1,047	1,690
Tuscaloosa	82	144	232
Tombigbee River Basin			
Fayette-Vernon-Hamilton	12	23	38
MISSISSIPPI:			
Tombigbee River Basin			
Pontotoc-Tupelo-Fulton	18	35	57
Amory-Aberdeen	15	27	42
Columbus-Starkville-West Point	123	196	285
Other River Basin Areas			
Corinth-Booneville-Iuka	14	27	44
Holly Springs	5	9	14

a/ Outside Appalachia

TABLE 10-6

GROSS WATER SUPPLY DEMANDS, AVAILABLE SUPPLY AND NEEDS IN MGD FOR SUB-REGION E

Item	Gross Demand (2020)	Dependable Supply by 1980	Needs
GEORGIA:			
Chattahoochee River Basin			
Dahlonega	5	5	
Gainesville	45	45	
Atlanta a/	1,225	475	750
Douglasville	19	19	
Total	1,294	544	750
Other River Basin Areas			
Toccoa-Cornelia-Clarksville	35	30	5
Alabama-Coosa River Basin			
Dalton-Calhoun	335	198	137
Rome	116	116	
Cartersville	23	23	
Cedartown-Rockmart	23	11	12
Summerville	19	19	
Villa Rica	6	6	
Carrollton-Bremen	29	20	9
Total	551	393	158
ALABAMA:			
Alabama-Coosa River Basin			
Gadsden	341	341	
Anniston	76	47	29
Talladega	99	99	
Wetumpka	34	34	
Total	550	521	29
Black Warrior River Basin			
Birmingham	1,690	880	810
Tuscaloosa	232	232	
Total	1,922	1,112	810
Tombigbee River Basin			
Fayette-Vernon-Hamilton	38	22	16
Total	38	22	16
MISSISSIPPI:			
Tombigbee River Basin			
Pontotoc-Tupelo-Fulton	57	57	
Amory-Aberdeen	42	42	
Columbus-Starkville-West Point	285	285	
Total	384	384	—
Other River Basin Areas			
Corinth-Booneville-Iuka	44	44	
Holly Springs	14	14	
Total	58	58	—

a/ Outside Appalachia

TABLE 10-7

WATER SUPPLY NEEDS AND ALTERNATIVES
WATER SUB-REGION E

Item	Needs in 2020 (mgd)	Alternative projects	Dependable Yield (mgd)
CHATTAHOOCHEE RIVER BASIN			
Atlanta a/	750	Roswell Reservoir	b/
ALABAMA-COOSA RIVER BASIN			
Dalton	137	Dalton Reservoir	137
Cedartown-Rockmart	12	Tallapoosa River	b/
Carrollton-Bremen	9	Chattahoochee River	b/
Anniston	29	Oakfuskee Reservoir	b/
BLACK WARRIOR RIVER BASIN			
Birmingham	810	Smiths Ford and Arkadelphia Reservoirs Combined	b/
TOMBIGBEE RIVER BASIN			
Fayette and Hamilton	16	Hamilton Reservoir	b/
OTHER RIVER BASIN AREAS			
Toccoa-Cornelia-Clarksville	5	Lake Burton	b/

a/ Outside Appalachia
b/ Capabilities considerably in excess of identified needs.

TABLE 10-8

ALTERNATIVE SOURCES AND COSTS FOR
WATER SUPPLY - WATER SUB-REGION E

Item	Alternative costs for 1,000 gal. dependable yield: Groundwater at wellhead	Surface storage at site	
Chattahoochee River Basin	0.25-0.75	$0.0045	Average cost of storage in Buford Reservoir
Alabama-Coosa River Basin	0.001-0.25	$0.0047	Average cost of storage in Dalton Reservoir
Black Warrior River Basin	0.05-0.25	$0.006	Average cost of storage in Smith's Ford and Arkadelphia Reservoirs
Tombigbee River Basin	0.001-0.25	$0.001-0.005	Average costs of storage in Yellow Creek and Hamilton Reservoirs

Maintenance of Stream Quality

As in other regions of the Nation, stream pollution in the sub-region is one of the more serious potential water resource problems. Careful planning to restore or maintain the water quality of streams at adequate levels is the responsibility of all levels of government and the private sector. The establishment and maintenance of stream classification standards is primarily a state function, but a Federal interest is exerted through the Federal Water Pollution Control Administration (FWPCA). In Sub-region E, private industry has invested large sums in recent years in treatment facilities. State requirements will induce even higher investments until after 1980; nevertheless, augmentation of the low flows of some streams will still be required to maintain water quality at satisfactory levels.

The FWPCA has projected stream pollution loadings for the sub-region which are given in Appendix D. These projections indicate that untreated waste loadings, expressed in millions of population-equivalents, will be 2.9, 6.5, 13.8 and 23.8 in 1960, 1980, 2000, and 2020, respectively. These values reflect loadings before treatment; they are therefore primarily of importance as indicators of the future investment required for additional treatment facilities. Appendix D does not provide information on specific problem areas but several streams have been studied separately in some detail by the FWPCA.

The FWPCA investigations indicated that a problem exists in the upper Savannah River basin where Estanollee and several smaller creeks in the upper reaches of Hartwell Reservoir are polluted by wastes from Toccoa, Georgia, and a large textile mill.

In the Chattanhoochee River basin, Atlanta, located adjacent to Appalachia, is the principal source of pollution and several smaller urban centers also contribute municipal and industrial wastes which degrade the water. Studies of the Chattahoochee River basin are currently underway by the Corps of Engineers which will include analyses of possible solutions of this and other water resource problems.

The sources of pollution in the Alabama-Coosa River basin, for the greater part, are in the upper portion in northwest Georgia. A serious problem in this area which is now being partially corrected through the development of treatment facilities is in the Chattooga River (tributary of the Coosa) where treated municipal and industrial wastes from Trion and Summerville impose heavy loadings on the stream. Similar problems in this area in the Etowah River are caused by wastes from Cartersville; in Big Cedar Creek, by wastes from Cedartown and Cave Spring; in the Tallapoosa River, by wastes from Villa Rica; in the Conasauga River, by either untreated or partially treated wastes from Dalton and Chatsworth and local industry; in the Oostanaula River, by wastes from Calhoun and several textile mills; and, in the upper Coosa River, by wastes from Rome and numerous large and small industries just downstream from Rome. These are areas of existing problems. The magnitude of potential future problems is indicated by studies made by the FWPCA of the Conasauga River

in the Dalton, Georgia, area. This northwest Georgia city is experiencing rapid growth due to the continuing expansion of the heavy water-using tufted textile industry which is centered in that area. Assuming that water in large volumes would be available for these industries, it is expected that growth of the Dalton area will provide waste loadings in the Conasauga River, after treatment to 85 percent effectiveness in BOD removal, of 16 thousands of population-equivalents in 1980, and increase to 41 thousands of population-equivalents by 2020.

In the lower Coosa River basin in Alabama, including the upper Alabama River area, the Coosa and Tallapoosa River waters are generally of good quality but waters in some tributaries of the former stream in the Gadsden, Anniston-Oxford, and Childersburg areas are grossly polluted and may present future water quality problems. Municipal and industrial effluents from sources in the Birmingham SMSA are discharged into Shades Creek and the Cahaba River which contribute to the Alabama River. Untreated wastes at Montgomery are discharged into the Alabama River.

The Birmingham SMSA is also the source of pollution in the Black Warrior River basin. Effluents discharged into several small streams including Five Mile, Valley and Village Creeks impair water quality downstream to the Locust Fork (tributary of Black Warrior River) arm of the impoundment of the John Hollis Bankhead Lock and Dam. Farther downstream, pollution of the Black Warrior River below Holt Lock and Dam by municipal and industrial wastes from the Tuscaloosa area is so severe that future growth and development will be retarded dependent upon a solution to the problem. The Black Warrior River basin pollution and other water resource problems are also currently being considered for solution in separate studies by the Corps of Engineers under its general investigations program. The FWPCA, the Alabama Water Improvement Commission, Gulf States Paper Corporation, and the Alabama Power Company are active in conducting stream quality surveys of the Black Warrior River.

The quality of the water in the Tombigbee River basin is generally good when compared to the previously discussed Black Warrior River Basin, primarily because of the rural character of the region. The existing problems as a rule are localized such as in Town Creek in the vicinity of Tupelo, Mississippi. Some water quality problems can be expected in the Tombigbee River and Luxapalila Creek at Columbus, Mississippi with continued industrial development in that area. Only a trace of stream pollution from the use of chemicals for crop treatment and fertilizer has been found to exist in the sub-region. Stream pollution from this source may decrease in the future due to the reduction in cropland acreage and a change from cotton and other farming which requires a high use of insecticides, pesticides, etc. to the grains and improved pastures.

As discussed previously, the responsibilities for the restoration and maintenance of stream water quality are shared in all fields of endeavor. There is a keen awareness of the problems in the sub-region

and private and public interests are cooperating in efforts to arrive at satisfactory solutions. The governments, through appropriate agencies, can further these efforts by encouraging the private sector to take necessary actions on a timely basis and providing technical and other assistance. In this regard, the U.S. Department of Agriculture has been very effective through the administration of several programs including:

a. Upstream Watershed Program (PL-566);

b. Technical assistance by the Soil Conservation Service to individual landowner, operator, or user in determining proper land use and planning and installing the needed conservation practices and measures and technical assistance on forest land by the State Forester in cooperation with U.S. Forest Service;

c. Cost sharing by the Agricultural Stabilization and Conservation Service with landowners and operators for carrying out needed conservation practices and measures, under either ACP or Sec. 203, PL 89-4; and

d. Water development and soil conservation loans by the Farmers Home Administration to landowners and operators in putting into effect basic soil and water conservation plans.

These programs need to be accelerated to encourage proper land use, the application of conservation measures and practices to stabilize eroding gullies, channels, roadbanks, ditches, strip-mine spoil, and new residential, industrial and highway construction, and the improvement of all vegetative cover.

The water quality needs, alternatives and needs satisfied by growth centers in the sub-region are given in Table 10-9.

RAW SEWAGE OUTFALL - CHATTAHOOCHEE RIVER, GEORGIA

TABLE 10-9

WATER QUALITY NEEDS, ALTERNATIVES AND NEEDS SATISFIED FOR GROWTH CENTERS IN WATER SUB-REGION E

Item	Needs 1,000 AF	Projects	Needs Satisfied	Residuals
GEORGIA:				
Toccoa-Cornelia-Clarksville	10.1	Treatment	10.1	
Dahlonega	2.0	Treatment	2.0	
Gainesville	15.2	Treatment	14.2	1.0
Atlanta a/	4.2	Treatment & Roswell Res.	4.2	
Douglasville	7.1	Treatment and diversion	7.1	
Dalton-Calhoun	11.4	Dalton Reservoir	11.4	
Rome	14.6 b/	Allatoona Reservoir	14.6	
Cartersville	c/	Allatoona Reservoir	c/	
Cedartown-Rockmart	6.7	Treatment	6.7	
Summerville	4.8	Watershed project	0	4.8
Villa-Rica	1.2	Watershed project	0	1.2
Carrollton-Bremen	5.8	Watershed projects	0	5.8
ALABAMA:				
Gadsden	25.9	Treatment	25.9	
Anniston	26.0	Treatment and watershed project	16	10.0
Talladega	15.9	Treatment	15.9	
Wetumpka	11.7	Treatment	11.7	
Birmingham	d/	Smiths Ford Res.	d/	
Tuscaloosa	371.0	Smiths Ford Res.	371.0	
Fayette-Vernon-Hamilton	12.7	Treatment	12.7	
MISSISSIPPI:				
Pontotoc-Tupelo-Fulton	18.8	Treatment	18.8	
Aberdeen-Amory	8.7	Treatment	8.7	
Columbus-Starkville-West Point	23.8	Treatment and Yellow Creek Res.	23.8	
Corinth-Booneville-Iuka	14.7	Treatment	14.7	
Holly Springs	6.3	Treatment	6.3	
TOTAL	1,034.4		1,011.6	22.8

a/ Outside Appalachia.
b/ Needs for Etowah River at Rome, in addition to 11,400 acre feet for Oostanaula River provided by Dalton Reservoir in supplying Dalton-Calhoun needs.
c/ Needs of 10,000 ac. ft. met as result of providing the Rome needs.
d/ Needs of 94,100 ac. ft. met as result of providing the Tuscaloosa needs.

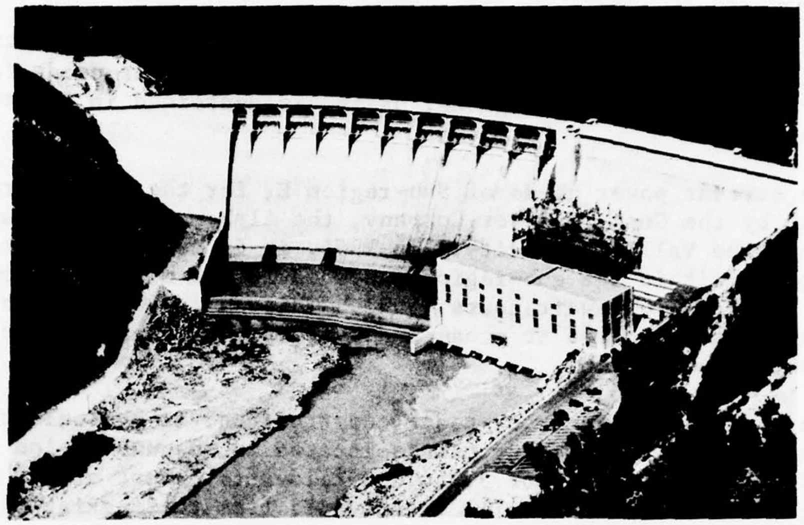
Power

A discussion concerning electric power needs, probable future installation of generating capacity, and cooling water needs for the Appalachian region, on a regional basis, is contained in Chapter 4 of Part I.

The current power needs of Sub-region E, for the major part, are supplied by the Georgia Power Company, the Alabama Power Company and the Tennessee Valley Authority. In 1964, it is estimated that power consumption within the sub-region exceeded 16,000 million kilowatt hours, or 16,000 gigawatt hours (gwh). This energy, with minor exceptions, was generated at steam and hydro plants located within and outside the sub-region.

There are at present, or under construciton, 21 hydroelectric and 15 steam-electric generating plants located in the sub-region with a total installed capacity of 5,354,800 kilowatts. Part of the future sub-regional energy needs will be provided from these existing plants and new developments that will be constructed in the sub-region. With the pooling arrangements now in vogue and the improved transmission facilities, a large part of the future needs can and will also be supplied from outside the sub-region many miles distant from the particular demand area. It is anticipated that power will be available from sources either within or outside the sub-region for expected future development as it occurs.

The current trend in constructing new generating facilities in the sub-region is to large steam-electric plants. This is because of the increasingly favorable costs of those type facilities in recent years and the few remaining sites for hydropower development. The best hydropower sites in the sub-region are already developed or planned for development. The remaining undeveloped sites with the best potential are located in the headwaters of the Coosa River in north Georgia, on the Tallapoosa River, tributaries of the Coosa River and on headwater streams of the Black Warrior River in Alabama. The Mississippi area is lacking in hydroelectric power potential because of the moderate topography, which is suitable only for low dams, and the unfavorable foundation and flow conditions. Pumped storage generation is possible at some of the potential sites, principally in north Georgia, for high-peaking power operations. Pumped storage facilities are now being constructed in this area at the Carters Dam on the Coosawattee River. Full development of all potential power sites, however, would provide only a very small part of the future sub-regional power needs. The future role of nuclear-powered generating plants in the sub-region is dependent upon economic factors and the solution of problems involved in the disposal of radioactive wastes. One such plant is now under construction by TVA in north Alabama on the Tennessee River, and the Alabama Power Company has plans for construction of another in Alabama on a navigable river (Chattahoochee).



HYDROPOWER PLANT - ALLATOONA DAM, GEORGIA

Recreation

The responsibilities for providing recreational opportunities, as with the maintenance of stream water quality, are also shared by all levels of government and the private sector. Due to the shorter work week and other factors, the per capita demand for recreational opportunities continues to increase in Water Sub-region E. It is estimated that as a result, and with the growing population, the needs by 1980 in the sub-region will be 50 million recreation days. About 223,000 acres of water surface area, located within reasonable travel distance from population centers, will be required to satisfy the need at that time for water-oriented recreation activities such as boating, swimming and fishing, provided past use trends of water surface areas are maintained. The existing reservoirs in the sub-region and those expected to be constructed by 1980 will provide a total water surface area of about 322,000 acres during the summer recreation period. These and other existing and planned reservoirs located adjacent to the sub-region meet the need, from an areal standpoint, to 1980.

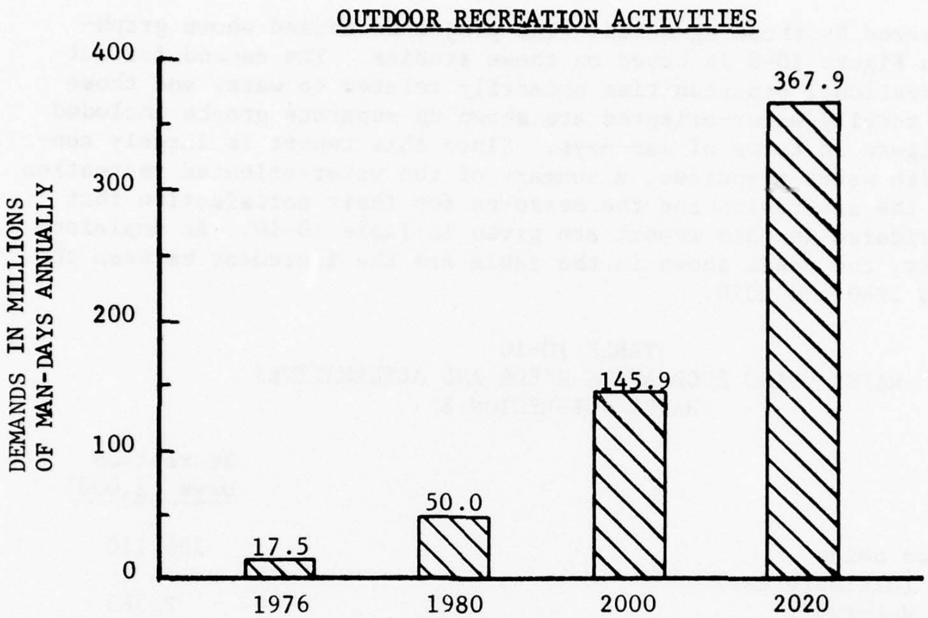
The demand for recreational opportunities is expected to increase from 50 million recreation days in 1980 to about 368 million recreation days in 2020. The demand for boating, swimming and fishing is estimated to increase to over 235 million recreation days with the needs from 1980 to 2020 being about 206 million recreation days. These estimates and projections are based on studies made by the Bureau of Outdoor Recreation and the U.S. Fish and Wildlife Service which are discussed in more detail in Appendices F and G, respectively, that

were prepared by those agencies. The projected demand shown graphically in Figure 10-8 is based on those studies. The demand for outdoor recreational opportunities primarily related to water and those that are totally water-oriented are shown on separate graphs included in the figure in terms of man-days. Since this report is largely concerned with water resources, a summary of the water-oriented recreation needs of the sub-region and the measures for their satisfaction that were considered in this report are given in Table 10-10. As explained previously, the needs shown in the table are the increment between the demand in 1980 and 2020.

TABLE 10-10
WATER USING RECREATION NEEDS AND ALTERNATIVES
WATER SUB-REGION E

Item	Recreation Days (1,000)
Recreation needs	206,110
Projects (ultimate use)	
Dalton Reservoir	2,385
Jacks and Socapotay Creek Watershed, Ala.	42
Little Sandy Creek Watershed, Ala.	28
Luxapalila Creek Watershed, Ala.	8
Mahan Creek Watershed, Ala.	12

The orderly and comprehensive development of recreation facilities requires long-range planning and coordination between state and local governments, the Federal government, and private groups and individuals. State recreation plans should be updated periodically in order to reflect the changing needs relative to the type, extent and location of the facilities required to supplement or complement basic and other facilities that are constructed by the Federal and local governments and private interests. Technical and financial assistance for additional public and private recreation facilities is available from the Federal government including the Economic Development Administration and several agencies of the Department of Agriculture.



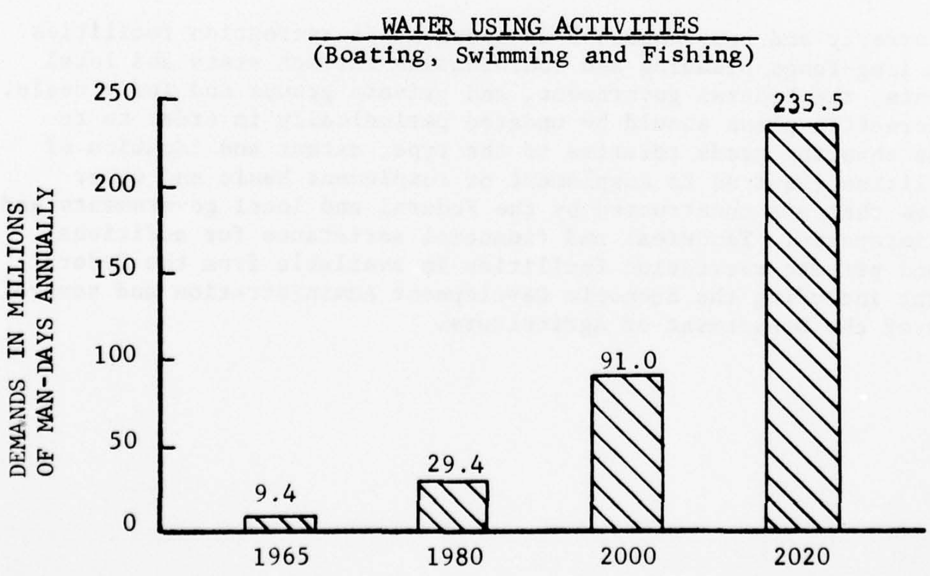


FIGURE 10-8 - PROJECTED DEMAND - FOR WATER USING AND OUTDOOR RECREATION OPPORTUNITIES IN WATER SUB-REGION E

CROWDED BEACH - ALLATOONA RESERVOIR, GEORGIA

Other and Summary

As discussed earlier, drainage problems which occur in both rural and urban areas in the sub-region are not expected to be inhibiting factors to economic growth and development. These needs can be met on an area by area basis in planning other water and related land resource developments. In some rural areas, existing wetlands should be left in their natural state to provide fish and wildlife habitat and preserve aesthetic features. Stream bank erosion does occur in some areas; this is Nature's method of enlarging channels to convey the higher runoff from areas undergoing development or other physical changes. Continued development could cause streambank erosion to become a significant problem in the sub-region. Sedimentation resulting from bank erosion along with that which occurs from soil erosion is prevalent to some extent throughout most of the sub-region and does impair stream water quality. Land treatment measures included in the upstream watershed programs as well as other programs which have been constructed or implemented with assistance provided by the U.S. Department of Agriculture have been effective in reducing or controlling sedimentation. These programs should be accelerated to limit the rate of sedimentation in downstream areas, insofar as possible, to acceptable levels. Irrigation in the past has been used in farm production in the sub-region

on a very limited scale. Less than one percent of the harvested cropland in 1964 was irrigated. This consisted primarily of supplemental irrigation on high-value crops such as commercial vegetables and fruits. Generally, the limited irrigation practices result, not from the lack of surface water, but from such factors as the high capital investment required for distribution system, irrigation equipment and operation expenses. Irrigation practices could probably become more widespread if distribution costs could be lowered.

Another major concern of the water resource planners is that of preservation and enhancement of the sub-region's environmental quality or cultural resources. Specific needs and programs related to archeological, historical and natural resources, except as related to areas where detailed project studies were made, have not been developed for the sub-region plan. However, in the future, consideration of each plan element programs can be developed which provide for the greatest improvement in the whole sub-region's environmental quality.

In summary, the principal water and related land resource needs of the sub-region are flood control, navigation, land conservation and development, water supply, maintenance of stream water quality, power and recreation. These problems are not necessarily summarized in their order of magnitude; on that basis, water supply and maintenance of stream water quality should probably be first. In the final analysis, however, all of the problems must be treated in the proper perspective from a comprehensive standpoint to assure the best uses of the water and related land resources. The water and related land resource needs of the sub-region shown by growth center in Table 10-11 and subsequent tables were derived on that basis. The needs shown, where applicable, include those of the specific growth center identified and the adjacent area or areas that are influenced by the center.

8. WATER RESOURCE NEEDS BY RIVER BASINS

The water needs discussed previously for the sub-region in general were also developed for river basins and sub-basins. As a basis for indicating trends and the relative magnitude of population and employment growth for individual basins, economic data that were derived for state planning sub-regions (SPS) were disaggregated or combined to essentially cover each specific basin area. Basin boundaries are depicted in Figures 10-9 through 10-12. The following paragraphs relate the economic analysis for portions or combinations of state planning sub-regions and the major river basin areas.

Chattahoochee River

The Appalachian portion of the Chattahoochee River Basin generally contains five counties in state planning sub-region 52, and all counties in SPF's 54 and 55. The following chart indicates the magnitude of population and employment implied by the developmental benchmark objectives.

TABLE 10-11

ESTIMATED WATER RESOURCE NEEDS TO SUPPORT FUTURE GROWTH CENTERS IN SUB-REGION E[a]

State/River Basin/Growth Center	Navigation Commodity Movements 1,000 Tons[b]	Current Flood Damage $1,000[c]	Flooded Area Acres[d]	Water Supply mgd[e]	Water Quality 1,000 AF	Recreation needs 1,000 man days[f]	Power: Peak Demand 1,000 KW	Power: Annual Million KwH
	Average Annual Values (Except for Flooded Area)							
GEORGIA								
Chattahoochee River Basin	4,569							
Dahlonega						670	80	470
Gainesville			180			4,570	550	3,220
Atlanta[g]				750	4.2			
Douglasville						2,440	300	1,710
Other River Basin Areas								
Toccoa-Cornelia-Clarksville	Undetermined		180	5		3,370	406	2,370
Alabama-Coosa River Basin	1,983							
Dalton-Calhoun		1.0	370	137	11.4	5,650	680	3,970
Rome		48.0	850		14.6	5,440	660	3,820
Cartersville			20			2,220	270	1,560
Cedartown-Rockmart		8.0	180	12		2,210	260	1,550
Summerville		27.9	20		4.8	1,570	190	1,100
Villa Rica					1.2	290	30	210
Carrollton-Bremen			90	9	5.8	1,680	180	1,040
ALABAMA								
Alabama-Coosa River Basin	9,581							
Gadsden		51.0	550			8,440	1,020	5,940
Anniston			780	29	10.0	8,350	1,010	5,870
Talladega		6.0	930			5,220	630	3,670
Wetumpka (Elmore County)		4.0	20			2,390	290	1,680
Black Warrior River Basin	22,982							
Birmingham		266[h]	1,870	810	94.1	53,150	6,420	37,360
Tuscaloosa		485	760		371.0	8,690	1,050	6,110
Tombigbee River Basin								
Fayette-Vernon-Hamilton			160	16		4,160	500	2,910
MISSISSIPPI								
Tombigbee River Basin	38,800							
Pontotoc-Tupelo-Fulton		30.4	580			6,100	740	4,310
Aberdeen-Amory		6.0	130			2,840	340	1,980
Columbus-Starkville-West Point		362.0	1,270		12.7	7,770	940	5,470
Other River Basin Areas								
Corinth-Booneville-Iuka			410			4,750	560	3,290
Holly Springs						2,050	250	1,340
TOTAL GROWTH CENTERS	N/A	1295.3	9,350	1,768	529.8	143,820	17,356	100,950
TOTAL WATER SUB-REGION E	77,915	11,780	i	2,511	1,104	206,110	44,270	249,200

a. Needs are expressed in terms of the increment between "supply" of, and "demand" for the water goods and services.

b. Navigation data expressed in terms of basin needs are not separable by growth center.

c. Residual urban damages after 1980 and sub-region total taken from table 10-1.

d. Additional flood plain area anticipated to be used for urban uses by 2020 in the damage reach containing growth center.

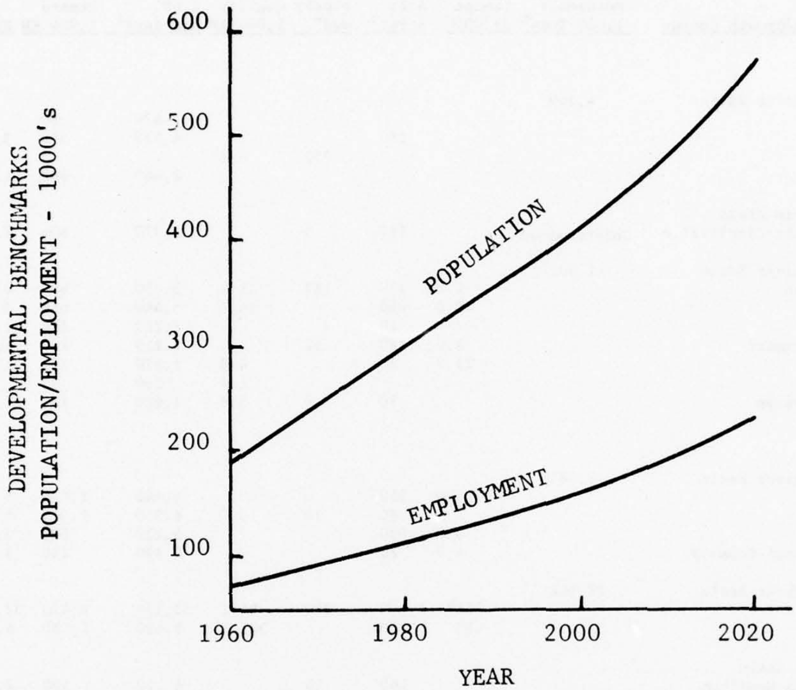
e. Derived from estimate given in table 10-4.

f. Limited to water using activities.

g. Outside Appalachia.

h. Primarily in Shades Creek area in Alabama-Coosa River Basin.

i. Total estimated need for urban land uses by 2020 in Water Sub-region E is 311,700 acres with 221,950 acres being in identified growth centers. Adequate supply of land is available to meet this level of use.



CHATTAHOOCHEE RIVER BASIN

Several growth centers are located within the Appalachian portion of the Chattahoochee River Basin, including Gainesville, Georgia, a primary growth center, and smaller centers such as Dahlonega and Douglasville, Georgia. Atlanta, Georgia, the major urban growth center in the basin, is located southeast of and adjacent to the Appalachian Region. Gwinnett County, which is a part of Atlanta's SMSA, is located in Appalachia. Atlanta's potential for growth is dependent upon the Chattahoochee River and tributaries for water supply of adequate quality. Also, augmentation of low flows of the river will be necessary to dilute wastes from the city even with treatment of all wastes for 90 percent BOD removal. The city is located at the head of a potential navigation project on the Chattahoochee River. Needs for flood control in the upper Chattahoochee River Basin, although substantial, are not as great as for other sections of the sub-region because there has been less encroachment on the flood plains. This is also true because of the substantial reduction of flood damages afforded by the Buford Reservoir project (Lake Sidney Lanier) which

provides a high degree of flood protection along a 50-mile reach of the Chattahoochee River between the dam and Atlanta. However, continuing urban-growth in the Atlanta area will increase the pressure for development of flood plain lands within and adjacent to the sub-region with a resultant increase in the flood damage potential.

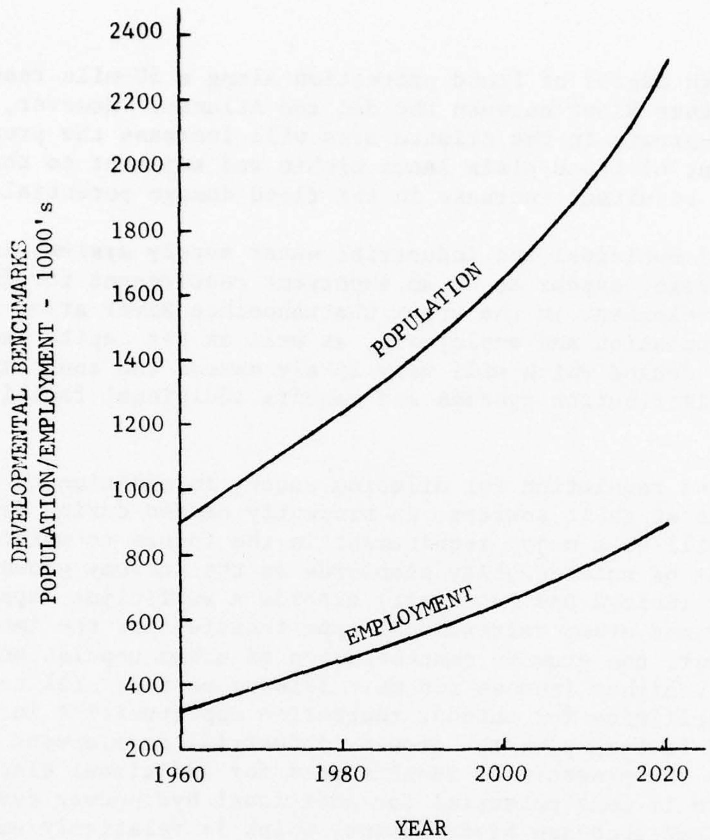
Additional municipal and industrial water supply system, including reservoir storage, appear to be an important requirement for future growth and development in the upper Chattahoochee River area. Increases in population and employment, as well as per capita water use, will create a demand which will very likely exceed the capacity of the present distribution systems and require additional facilities by about 1980.

Storage and regulation for dilution water, in addition to treatment of wastes at their sources, is presently needed during dry periods and will be a major requirement in the future to maintain any reasonable set of water quality standards as the economy grows. Lake Sidney Lanier (Buford Dam Reservoir) affords a sufficient supply of fishing water and other recreational opportunities for the immediate future; however, the growing concentration of urban population accompanied by higher incomes and more leisure periods will require additional facilities for outdoor recreation opportunities in the basin. These factors plus the growing industrial development will also increase the pressure or requirements for additional electric energy. There is some potential for additional hydropower development in the Chattahoochee River Basins, which is relatively small when compared to the expected future demand for energy in the sub-region. Estimated needs for the various growth centers in the Chattahoochee River Basin are given in Table 10-11.

Alabama-Coosa River Basin

The Appalachian portion of the Alabama-Coose River Basin generally contains four counties in State Planning Sub-region 52, nine counties in SPS 51, one county in SPS 55, all counties in SPS's 57 and 58, and five counties in SPS 59. The following chart indicates the magnitude of population and employment implied by the development benchmark objectives.

Seven growth centers are located in the Georgia portion of the Alabama-Coosa River Basin and four in the Alabama area with the greater concentration of population being in Alabama. Included in this basin are the primary growth centers of Rome, Dalton-Calhoun, Cartersville, and Carrollton-Bremen in Georgia, and Gadsden, Anniston, Talladega and Wetumpka (Elmore County portion of the Montgomery SMSA) in Alabama; and, smaller growth centers such as Cedartown-Rockmart, Summerville, and Villa Rica in Georgia. Montgomery, Alabama is



ALABAMA-COOSA RIVER BASIN

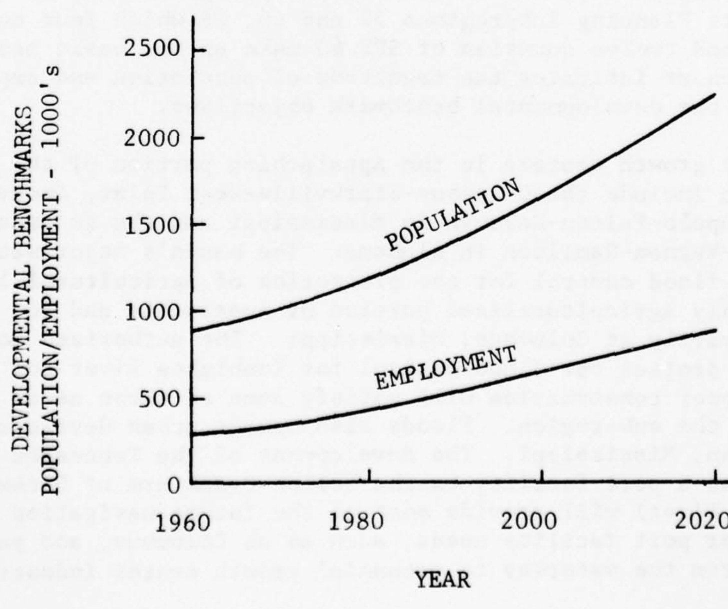
located outside Appalachia on the left or south bank of the Alabama River which forms the southern boundary of the Region in Alabama but its economic influence extends into Elmore County in Appalachia. Its future growth potential will be enhanced upon completion of the Alabama River Waterway to Montgomery. This waterway is scheduled to be opened for navigation to Montgomery in early 1970's. The city's growth is also dependent upon the river's potential for assimilating wastes after treatment during low flow periods. Needs for flood control or non-structural measures to minimize flood losses exist at several localities in the Alabama-Coosa River Basin such as Gadsden, Childersburg, and Birmingham (Shades Creek) because urbanization has resulted in encroachment on the flood plains. Substantial damages will occur to agriculture throughout the basin. Continuing growth will increase the pressure for developing flood plain lands thus increasing the flood damage potential. Development of water supply storage and convevance systems, especially in the headwaters area of the Coosa portion of the basin, is a need which must be considered in planning water resources development in the Alabama-Coosa River

Basin. The main stem of the Coosa River between Montgomery, Alabama, and Rome, Georgia, has additional potential which could be developed by the construction of navigation locks at existing privately-owned power dams which would provide for the movement of substantial waterborne commerce. Hydropower sites on the tributaries of the Coosa River and on the Tallapoosa River portion of the Alabama-Coosa River Basin have a potential for development ranging from fair to good. Construction of projects at all of these sites, however, would provide only a small part of the sub-region's future electric power needs.

Storage and regulation of stream flows for dilution water will be necessary to maintain water quality standards as the economy grows. The growing urban population accompanied by higher incomes and more leisure periods will require additional facilities for outdoor recreational opportunities in the sub-region. These same factors, in addition to the growing industrial development, contribute to the increasing demand for electric power. Estimated needs for the various growth centers in the Alabama-Coosa River Basin are given in Table 10-11.

Black Warrior River

The Black Warrior River Basin located entirely in Alabama is contained within six counties of State Planning Sub-region 59. The following chart indicates the magnitude of population and employment implied by the developmental benchmark objectives.



BLACK WARRIOR RIVER BASIN

The primary growth centers within the Black Warrior River Basin are Birmingham and Tuscaloosa, Alabama. Other urban areas within the basin, Cordova, Jasper, Cullman and Oneonta, would also be benefically affected by economic and water resource developments in the Black Warrior River Basin. Flood control needs for this river basin are concentrated in the Tuscaloosa growth center area on the main stem and lesser damage areas such as the Black Warrior River portion of the Birmingham SMSA. Other damage areas are primarily rural in nature and fairly well spread over the basin but floods on several small tributaries, such as Valley and Village Creeks, damage urban development in the Birmingham area. A major need for water quality control in the Black Warrior River Basin from the vicinity of Birmingham downstream to the Tuscaloosa area is associated with the present industrial development in the basin. Full treatment of the wastes at their sources and low flow augmentation will be required for future growth. After replacement of the outmoded lock at Bankhead Dam, the future navigation need is for a new lock on the Black Warrior River at the William Bacon Oliver Dam at Tuscaloosa. Water supply, recreation and electric power needs are associated with projected increases in population, employment and incomes for the basin area. There are several potential hydropower sites in the Black Warrior Basin, but their development would provide only a small part of the anticipated future power needs. Detailed estimates of water needs by growth centers within the Black Warrior River Basin portion of Appalachia are listed in Table 10-11.

Tombigbee River

The Tombigbee River Basin in Mississippi and Alabama is contained within State Planning Sub-regions 59 and 60, of which four counties of SPS 59 and twelve counties of SPS 60 make up the basin area. The following chart indicates the magnitude of population and employment implied by the developmental benchmark objectives.

Primary growth centers in the Appalachian portion of the Tombigbee River Basin include the Columbus-Starkville-West Point, Amory-Aberdeen, Pontotoc-Tupelo-Fulton-Baldwyn in Mississippi and the secondary center of Fayette-Vernon-Hamilton in Alabama. The basin's major water need is related to flood control for the protection of agricultural lands in this rather highly agriculturalized portion of Appalachia and for urban development primarily at Columbus, Mississippi. The authorized Corps of Engineers' project for flood control for Tombigbee River and tributaries which is under construction will satisfy some of these needs in this portion of the sub-region. Floods also damage urban development at Tupelo and Aberdeen, Mississippi. The development of the Tennessee-Tombigbee Waterway and a port facility on the Yellow Creek arm of Pickwick Lake (Tennessee River) will provide most of the future navigation needs of the area. Other port facility needs, such as at Columbus, and possibly spur channels from the waterway to potential growth center industrial sites can

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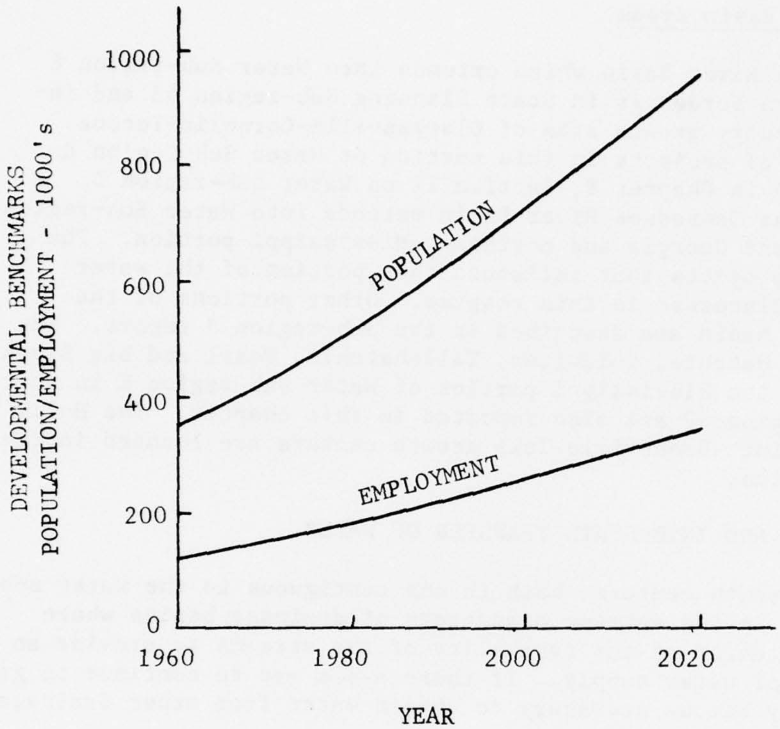

TOMBIGBEE RIVER BASIN

also be anticipated. The waterway project will involve construction of five reservoirs, excluding small navigation pools, having a total of about 38,000 acres of water surface area which will provide substantial opportunity for water oriented recreation in the basin. This project for navigation also has a potential as a source of water supplies and possibly several rural water districts could take advantage of the impoundments to obtain raw water. Based on the population and employment increases projected for the 50-year study period, it appears that low flow augmentation on tributary streams for maintenance of stream water quality at acceptable standards is another need for consideration in the planning of the basin's water resources. The further industrialization of the area, as expected with the development of the Tennessee-Tombigbee Waterway, will also create a need for additional electric power. Since the basin's topography and other features are unfavorable for hydropower development, these needs will have to be met by thermal plants or transmitted from adjacent areas, such as the Tennessee and Black Warrior River Basins. Detailed estimates of

water and related resource needs within the Tombigbee River Basin portion of Appalachia are given by growth centers in Table 10-11.

Other River Basin Areas

The Savannah River Basin which extends into Water Sub-region E along the eastern border is in State Planning Sub-region 52 and includes the secondary growth area of Clarkesville-Cornelia-Toccoa. Some discussion of projects in this portion of Water Sub-region E is also reported in Chapter 8, Section II on Water Sub-region D. A small part of the Tennessee River Basin extends into Water Sub-region E in the northeast Georgia and northeast Mississippi portion. The water resource projects that influence this portion of the water sub-region are discussed in this chapter. Other portions of the Tennessee River Basin are described in the Sub-region J report. The portions of the Hatchie, Coldwater, Tallahatchie, Pearl and Big Black River Basins in the Mississippi portion of Water Sub-region E in State Planning Sub-region 60 are also reported in this chapter. The Holly Springs and Corinth-Booneville-Iuka growth centers are located in the Mississippi Basins.

9. INTER-BASIN AND INTERSTATE TRANSFER OF WATER

There are growth centers, both in and contiguous to the water sub-region, located in the extreme headwaters of drainage basins where there is a limitation of the capability of the streams to provide an adequate flow for water supply. If these areas are to continue to grow, it will probably become necessary to obtain water from other drainage basins.

Gainesville and Atlanta in the Chattahoochee River Basin discharge treated municipal waste into the minor tributaries of the Altamaha River Basin while their water supplies are provided by the Chattahoochee River and tributaries.

Dalton Reservoir, in the headwaters of the Alabama-Coosa River Basin, is formulated in this report, Chapter 8, Part III, on the premise of providing water for a multi-county area in north Georgia. This will entail transfer of water between several headwater streams, of which some are tributaries of the Tennessee River and others contribute to the Coosa River.

Small urban areas in north Alabama take water from the Tennessee River and discharge treated wastes into the Black Warrior River tributaries in Alabama. Also, the Birmingham growth center takes part of its municipal water from the Little Cahaba River in the Alabama-Coosa River Basin and wastes are discharged into tributaries of the Black Warrior River. This center is primarily located in the Black Warrior River Basin area but some eastern suburbs of Birmingham, such as Irondale, Mountain Brook and Homewood, are on the Birmingham water

and waste systems and their return flows enter tributaries of the Cahaba River.

Upon completion of the Tennessee-Tombigbee Waterway an inter-basin and interstate transfer of water will occur in connection with lockages at the Bay Springs Lock and Dam because the basin divide will be cut to provide barge access between the Tombigbee and Tennessee River systems. The transfer will be from the Tennessee River (Pickwick Dam Reservoir) in Tennessee southward to the Tombigbee River in Mississippi.

SECTION III - ALTERNATIVES FOR MEETING NEEDS

10. STRUCTURAL

Structural alternatives considered in this report have been selected from a variety of Federal, state and private water resource development opportunities. Consideration for provision of flood protection includes storage of flood waters in impoundments, levees, flood walls, channel improvements, stream diversion, and combinations of these type projects. Alternatives for providing municipal and industrial water supplies considered both surface and ground water sources. Water quality improvements would be accomplished by the most advantageous and economic means, whether by dilution or by a higher degree of treatment of waste waters at their sources or a combination thereof. The relevant structural alternatives are discussed below. These discussions do not include alternatives for recreation, wildlife and power as they are widespread in nature and not limited to growth centers. These purposes are discussed on a regional basis in Paragraph 13 of Section IV of this chapter.

Chattahoochee River Basin

Gainesville, Georgia, is the only primary growth center located in the Appalachian portion of the Chattahoochee River Basin which also includes two secondary growth centers, Dahlonega and Douglasville. However, the greatest center of economic influence in the southeast, Atlanta, Georgia, is located in the basin just outside of Appalachia. This metropolis is dependent upon the Chattahoochee River for water supply and future needs for dilution of wastes entering the river in the city area must be supplied from storage in the upstream basin to the north in Water Sub-region E.

Dahlonega

From a water resource standpoint, the Dahlonega area needs appear to be relatively small. Sufficient flood free lands are available in the area for expansion and, with proper planning, future flood plain encroachments should be minimal. Stream flows are deemed adequate to meet the foreseeable future needs for water supply and dilution of wastes as determined from the projected population and employment growth in the Dahlonega area. Pumping, treatment and conveyance systems for water supply and waste treatment facilities are deemed the prime concern in this area. The new Appalachian highway, Corridor A, provides access to the widely known Blue Ridge and Great Smoky Mountain recreational areas as well as immediate access to Lake Sidney Lanier (Buford Dam Reservoir) for water orientated recreation activities. Non-water orientated economic needs such as adequate land use planning, vocational and other schools and medical facilities are considered to be the major impediments to the future growth and economy of Dahlonega.

Gainesville

There are no known water resource problems of significant proportions related to the Gainesville, Georgia, growth center. About 180 acres of flood plain land are estimated to be needed to accommodate future urban growth during the 50-year study period. The growth center is located adjacent to and east of Lake Sidney Lanier on the Chattahoochee River formed by the Corps of Engineers' Buford Dam which provides water supply, flood control, hydropower and recreation. Water supply contracts with the Corps for water storage in Lake Sidney Lanier are updated periodically to meet Gainesville's needs. Presently, the city has water supply storage of 7,840 acre-feet under contract which is equivalent to about 8 mgd. A small portion of the growth center's municipal waste water after treatment is diverted into tributaries of the Oconee River. Also, the town of Buford, Georgia, located about 15 miles southwest of Gainesville has a water supply storage reserve in Lake Sidney Lanier equivalent to about 2 mgd.

Atlanta

The water resource problems in the Atlanta growth center are related to land development, future water supply, and the maintenance of stream water quality. Atlanta is located primarily outside of Appalachia; therefore, an estimate of urban lands required for future urban expansion has not been determined but an acute awareness of these needs exists within the Corps. The future water supply and water quality problems of the Atlanta area are dependent largely on waters from the Chattahoochie Basin for solution; therefore, an appraisal was made to obtain an indication of the magnitude of their needs. Analysis of their problem and possible solutions are the subject of more detailed studies now in progress in the Mobile District under other authority. The appraisal indicated that the water supply demand for Atlanta (Clayton, Cobb, Dekalb, Fulton and Gwinnett Counties) by the year 2020 would be about 1225 mgd, of which 475 mgd is expected to be provided by 1980 from municipal and private supplies in the area. Meeting Atlanta's water supply needs of 750 mgd for the period 1980 to 2020 is related to flow regulation on the Chattahoochee River. Other reservoir storage, in addition to that now reserved in the Buford Dam Reservoir, may be a practicable solution to providing the needs, since flow augmentation for the maintenance of stream water quality in the Chattahoochee River below Atlanta will also be needed. The indicated water quality control needs of 420,000 acre-feet per year and water supply needs of 450 mgd could be met by a dam at the Roswell site about 6 1/2 miles upstream from Morgan Falls Dam, an existing privately-owned power dam near Atlanta. Meeting the water use needs of Atlanta by using the power and about half of the dead storage in Buford Reservoir is a possibility, but the entire peaking power capability of the project would be lost. Power releases from Buford Dam are sufficient to provide most of the future water supply needs of Atlanta, but substantial and costly changes in municipal pumping and storage facilities

would be necessary because of large volumes of water being released over short periods of time for generating peaking power.

Douglasville

Water resource problems in the Douglasville growth center are related to conveyance systems for water supply and waste disposal facilities. The influence of metropolitan Atlanta is expected to have a very significant impact on the future economy of Douglasville. The increased population and employment will create a water supply demand much greater than the capability of present sources serving Douglasville. Planning on the local level for future water supply needs for Douglasville has found that these needs can be economically met by purchase of treated water from the Cobb County-Marietta system, which presently serves Marietta, Georgia, and adjacent urban areas of the county. The source of water supply for the Cobb County-Marietta System, the Chattahoochee River and Allatoona Reservoir, are deemed adequate to meet the future demand. Presently, the Douglasville growth center is in critical need of waste treatment facilities and the future needs are mainly concerned with diversion of treated wastes to discharge directly into the Chattahoochee River or other streams in the area having adequate assimilative capacity.

Alabama-Coosa River Basin

There are eleven growth centers in the Alabama-Coosa River Basin located wholly or partially in Water Sub-region E, eight of which are primary and three are secondary centers. The primary growth centers are Rome, Dalton-Calhoun, Cartersville and Carrollton-Bremen in Georgia and Gadsden, Anniston, Talladega and Wetumpka (Elmore County portion of the Montgomery SMSA) in Alabama. Secondary growth centers are Summerville, Cedartown-Rockmart and Villa Rica, Georgia.

Dalton-Calhoun

The water related needs for the Dalton-Calhoun growth centers are concerned with water supply, water quality control, and flood control. The water supply demand in 2020 of 137 mgd and the water quality control needs for the Dalton portion of this growth center are planned for provision by the Dalton Reservoir. The water supply demand in 2020 of 46 mgd for Calhoun can easily be met from available stream flow. Since the regulated water quality flows from the Dalton Reservoir would pass Calhoun in the Oostanaula River, additional water quality control storage for Calhoun is not needed. It is estimated that flood plain lands of 390 acres will be needed for urban use by 2020. Average annual flood damages on present urban acreage at Calhoun amount to $1,000 and reduction in flood stages in the area by storage in Dalton Reservoir would eliminate these damages.

Cartersville

There are no significant flood control or water supply needs that would be an impediment to growth in the Cartersville area. Water supply needs are met by the Allatoona Reservoir under terms of a contract with the Corps of Engineers for storage capacity. Presently, Cartersville has contracted for 5,900 acre-feet of storage in the reservoir equivalent to 6 mgd which provides the needs until about 1980. Additional storage for water supply is negotiable as the needs arise with the 2020 needs of 23 mgd being assured from an availability standpoint. Low flow augmentation needs of Cartersville of 10,000 acre-feet per year to maintain acceptable water quality standards in the Etowah River in the year 2020 can be met by the 15,000 acre-feet provided for Rome if the storage is located in the Allatoona Reservoir or other potential upstream impoundments. A very minor need for flood plain lands for urban use by 2020 is estimated since ample flood-free lands are available for development.

Rome

The water related problems at Rome, Georgia, are concerned primarily with flood control, navigation and water quality control. It is estimated that an additional 850 acres of flood plain lands will be needed during the study period. Average annual flood damages on presently used flood plain areas along the Oostanaula, Etowah and Coosa Rivers in the Rome growth center amount to $49,000. The Dalton Reservoir project would reduce flood stages on the Oostanaula and Coosa Rivers at Rome and provide a reduction in the annual damages of $19,000. The authorized Coosa River navigation project will terminate at Rome. Port facilities, including a turning basin, will be required on the Coosa River downstream from the business district of the city. Water quality control needs, assuming secondary treatment is provided, are estimated to be 15,000 acre-feet of storage in impoundments on the Etowah River combined with 11,400 acre-feet of storage in the Dalton Reservoir for regulating flows of the Oostanaula River to maintain acceptable standards in the Rome area. The Carters Reservoir project will also assist in regulating flows in the Oostanaula River due to the project plan containing a structure downstream for reregulation of power releases and an embayment for pumped-storage power. The estimated water supply demand for the Rome growth center of 116 mgd in 2020 can be met from available stream flow in the area. Enlargement of pumping, treatment and conveyance systems is needed in meeting the estimated demand.

Cedartown-Rockmart

The water resource needs in this growth center are for water supply storage and conveyance facilities and additional water treatment facilities for maintenance of stream quality. These urban centers are located in the tributary area of the Etowah River but very near the drainage divide with the Tallapoosa River. Present sources of water supply are capable of meeting the estimated demand to 1980, but

a new source having the capability of producing an additional 12 mgd will be needed to meet a demand of 23 mgd estimated for 2020. This future source could be the Allatoona Reservoir which would involve a rather extensive conveyance system. The consideration of additional storage on the Tallapoosa River upstream from the Little River juncture and conveyance to the urban use centers as a likely alternative appears to be practicable. Compared to other areas of the sub-region, this drainage basin has almost no pollution from urban or other sources and a potential for gravity flow from this source makes the alternative more attractive. Detailed study of this potential site is needed. Maintenance of water quality in streams in the Cedartown-Rockmart area could be achieved by treatment and abandonment of present use of streams as water supply sources so that their total flow could be used for pollution control. Urban flood damages in the growth center from overflow of Euharlee Creek are estimated to be about $17,000 annually. Some additional use of flood plain lands is expected, but most of the future urban growth will occur in flood-free areas.

Summerville

The major water related needs in the summerville area are associated with water quality control measures. The present water supply source is capable of providing the estimated future demand. This area experiences one of the Southeast's worst conditions of stream pollution from untreated industrial wastes. The Chattooga River, a tributary of the Coosa River, flows south through the eastern edge of Summerville, Georgia. The normal flow of this stream is relatively high but during periods of low rainfall stream flow is drastically reduced in comparison to the industrial waste loads. About 4,800 acre-feet of storage for low flow augmentation will be needed by 2020 to provide adequate dilution after treatment has been provided. The U.S. Department of Agriculture is planning the Headwaters Chattooga River Upstream Watershed project which can provide flood protection, water supply and water quality control needs for the Lafayette, Trion and Summerville, Georgia areas, provided that the additional beneficial storage in the watershed plan is used for maintenance of stream quality. Trion and Lafayette are urban centers in the Chattooga River watershed upstream from Summerville. Topographically, the Summerville area lies in a valley between two ridges, but flood-free developable lands are sufficient to meet the projected urban growth estimates. The need for use of only 20 acres of flood plain land for urban development is expected by 2020. Annual flood damages in the area of $65,000 which include about $28,000 in urban areas will be reduced to $15,000 by the Headwaters Chattooga River watershed project.

Gadsden

The Gadsden growth center is the largest in the Appalachian portion of the Alabama-Coosa River Basin. Its water use problems are related to navigation, flood control and water quality control. A

significant impediment to economic growth of the area is the lack of barge transportation for receiving and shipping raw materials and finished products for existing and future industry. Local interests should plan for a spur channel in Big Black Creek from the Coosa River waterway, when it is constructed, to a major potential shipper on the water route. Port facilities on the Coosa River at the city will also be needed. As a result of the Alabama Power Company's development of the Coosa River for hydroelectric power, there are several major reservoirs which could provide future water supply. Local urban flood protection for developable flood plain lands and reduction of annual flood damages in the area are needed. It is estimated that 550 acres of flood plain lands will be required to meet Gadsden's future urban land needs. An extensive waste treatment program will be required in the future in order to maintain reasonable quality in the H. Neely Henry Reservoir and prevent serious limitations on its future use for water oriented recreation activity.

Anniston

Presently the Anniston growth center has only minor water related problems but in terms of the future, after 1980, the water supply and water quality control needs could become serious impediments to growth without adequate planning for a timely solution to these potential problems. Current flood damage in the Choccolocco Creek area is estimated to be $228,390 annually and improvement in this watershed by the USDA would reduce these flood damages to $35,040, annually. By the year 2020 the demand for water supply is estimated to be 76 mgd. Springs, now providing the source of municipal supply for Anniston, and planned storage of 9,792 acre-feet in the Choccolocco Creek Upstream Watershed project for additional future supply have a combined capacity of 47 mgd which are estimated to meet the needs until about year 2005. Major impoundment of the Tallapoosa River south of Heflin, Alabama, at the Oakfuskee Reservoir site or the Alabama Power Company's existing H. Neely Henry Reservoir on the Coosa River should be considered for providing Anniston's water supply needs beyond the year 2005. The conveyance of water from either of these potential sources would involve about the same distance and the economics of storage costs and treatment and would be the prime concern for choosing the better alternative. In regard to the quality of water impounded, the Tallapoosa Basin may offer the better source as well as be more advantageous for serving suburban Anniston with the greater potential savings in distribution costs on a county or multi-county system. The planned storage for water supply in the Choccolocca Creek Watershed project and the presently used springs can meet the low flow augmentation needs for water quality control when the larger municipal water supply source is developed. In the interim, about 5,000 acre-feet of storage for water quality control will be needed to maintain stream standards in Choccolocco Creek. The watershed work plan for Choccolocco Creek is sufficiently flexible to meet these needs. Water quality problems in the area presently are primarily the result of untreated industrial and inadequately treated wastes being discharged into Choccolocco Creek.

Talladega

The Talladega growth center (Talladega County) also includes the urban centers of Sylacauga and Childersburg in Alabama. Significant water related needs are apparent in this area, with the water supply aspects planned on the local level. Floods on the Coosa River in the vicinity of Childersburg cause annual damages of $6,000. About 930 acres of flood plain lands in the growth center area are expected to be needed for urban development during the study period. Flood-free lands are sufficient to meet the future growth center needs but a program of land use planning with possible management is needed to discourage or prevent future unwise use of flood plain lands. Indications are that a substantial additional demand for water supply will occur during the study period; however, adequate stream flow and groundwater are available to meet the estimated future demand of 99 mgd. The major concern with water supply is the selection of the most economical alternative and means of conveyance to the use areas. Planning for water supply on an individual community basis may be a serious impediment to realizing the full growth projected for this area unless groundwater supplies are capable of meeting the demand. Because the maintenance of stream water quality in this area at acceptable standards is directly related to the selected source of water supply, further use of tributaries of the Coosa River in this area for supply may create a serious deficiency in stream flow for assimilation of treated waste water. It appears that a plan for a raw water intake in the Coosa River with treatment facilities at the site and pumping of purified water to the Childersburg, Sylacauga, and Talladega urban areas with allowance for intermediate rural use along the transmission line or lines should be given consideration by planners in this area. Specific and more comprehensive planning for future water supply and water quality control is needed. Considerable growth in this area as a result of providing a navigable waterway on the Coosa River is related to terminal and dock facilities in the Childersburg area for water borne commerce services to the county and the Talladega growth center.

Villa Rica

The major water related problems in the Villa Rica growth center are water supply conveyance and waste treatment facilities. Flood control needs and the possibility of urban encroachments on flood plain lands are not considered to be significant factors influencing the future growth of Villa Rica. The Soil Conservation and Forest Services have planned the Little Tallapoosa River Upstream Watershed project to provide storage capacity to meet the water supply demand until the year 2020. The economics of the multi-county system for providing Carroll, Haralson and Heard Counties with future water supply should be favorable by the year 2020 and the needs of Villa Rica should be met therefrom. This multi-county system is discussed in the following paragraph in connection with meeting the Carrollton-Bremen growth

needs. After adequate treatment is provided, storage of 1,200 acre-feet is needed for maintenance of stream water quality in the Little Tallapoosa River. This storage could be met by small structures in the Little Tallapoosa River watershed project planned by the USDA.

Carrollton-Bremen

The water related needs of the Carrollton-Bremen growth center are concerned primarily with future water supply and water quality control. Urban flood damage in these centers is minor but considerable damage occurs in agricultural areas. The Soil Conservation Service in their planning of the Little Tallapoosa River and Lower Little Tallapoosa River Watershed projects are meeting the flood control needs and providing storage for water supply capable of meeting the estimated needs of 20 mgd by the year 2000. Planning on the local level by the city and county leaders, consider the most practicable means of meeting water supply needs of this area after the year 2000 to be a multi-county distribution system serving Carroll, Haralson and Heard Counties, with the Chattahoochee River in the vicinity of Whitesburg, Georgia, as the source of raw water. This source is deemed adequate to serve this area, as well as other areas should the need arise. With this source in use the abandonment of previously used water supply storage sites in the Little and Lower Little Tallapoosa River watershed projects would be feasible since these impoundments could better serve to provide a low flow augmentation needs of 5,800 acre-feet per year for maintenance of stream quality in the Little Tallapoosa River.

Wetumpka

The water related needs of the Elmore County or Wetumpka growth center are primarily concerned with navigation on the Alabama and Coosa Rivers. Some flood damage in this area is related to urban type development but the major damage is to agricultural developments. Flooding on the Coosa River in the Wetumpka area causes annual damages to urban development of $4,000 while a total annual damage of $56,000 occurs along the Coosa River and the right bank of the Alabama River. Montgomery, Alabama, is located across the Alabama River from Elmore County. Water supply and water quality control demands are met by streams in this area. Although developable flood-free lands are available for urban uses, encroachment on the flood plain is occurring and it is apparent that a flood plain information and management program will be needed.

Black Warrior River Basin

Primary growth centers in the Black Warrior River Basin are Birmingham and Tuscaloosa, Alabama. Jasper and Cullman are service

centers for the rather large rural areas of Walker and Cullman Counties. The economy of Jasper is dominated by Birmingham, and Cullman is considered to be located in the southern tip of the Huntsville-Decatur-Florence growth area.

Birmingham

Associated with this large urban center (1960 population of 340,887) are demands for future water supply, flow augmentation for water quality control, and urban land use. Other water related needs such as flood control are also apparent. A serious problem of stream polluton in the Locust Fork of the Black Warrior River and contributing streams originating in the urban center (Five Mile, Village and Valley Creeks) exist now with secondary treatment (85 percent BOD removal) provided. Without diversion of treated wastes to bypass the streams, it is not likely that these three creeks will ever be brought up to standards acceptable for fishing of 4 miligrams per liter of dissolved oxygen (4 mgl DO) or to even a standard of 2 mgl DO. Standards have been proposed for treated waste transport for these creeks in the urban reaches and agriculture and industrial use in the downstream reaches. At the mouth of Valley Creek near Bankhead Lake, fish and wildlife standards have been proposed. Based on flow requirements to maintain a desired standard of 4 mgl DO in the Locust Fork during the 50-year study period, storage requirements in the Smiths Ford Reservoir site of 94,000 acre-feet and treatment effective in BOD removal to 85 percent would be required. All of Birmingham's industrial water supply is taken from impoundments on tributaries of the Black Warrior River (Inland Lake on the Blackburn Fork, tributary of Locust Fork, and Lewis M. Smith Lake on Sipsey Fork). The municipal water supply is provided by storage in Lake Purdy on the Little Cahaba River which is in the Alabama-Coosa River Basin. These systems are integrated to allow treatment of water from the industrial system in municipal facilities for domestic use. The capacity of this system is presently estimated to be 180 mgd, of which 125 mgd is on the city's industrial system. The demand by 2020 for water supply in the Birmingham growth center is estimated to be 1,690 mgd with individual company system meeting 700 mgd and the municipal industrial and domestic systems providing the remaining 990 mgd. Meeting the needs for 810 mgd by additional purchase from the Lake Smith project and other potential impoundment on the Locust Fork are practicable sources which would require new or additional conveyance systems. As discussed in the preceding text on the Alabama-Coosa River Basin, a study to determine the feasibility of flood control improvements on the Shades Creek watershed area along Birmingham's eastern urban sections, Irondale, Mountain Brook and Homewood, is presently underway by the Corps. It is estimated that 1,870 acres of flood plain area will be needed for urban developments by 2020.

Tuscaloosa

The principal water resource needs of the Tuscaloosa growth center are flood control and water quality control. Floods on the

Black Warrior River in this urban center, including the adjacent town of Northport, cause annual damages of $485,000. Reduction of flood stages in the Tuscaloosa area by storage in a reservoir on the Locust Fork near Birmingham or on the Mulberry Fork would offer partial protection and levee systems in the flood plain areas where heaviest urban damages occur (Tuscaloosa and Northport) would afford essentially complete flood protection. Flow augmentation needs to maintain the Alabama Water Improvement Commission's proposed standard of agricultural and industrial use of 2 mgl in the Oliver pool on the Black Warrior River at Tuscaloosa, will require a regulated flow from 371,000 acre-feet per year of storage in potential reservoirs upstream from the problem area. This storage requirement is based on flow needs with treatment of 85 percent BOD removal at the pollution source. These needs are critical because industrial growth of water using industries in this area has presently reached its maximum allowable based on these stream quality standards. The maintenance of a higher stream standard in this area would result in a minor increase in water surface area for recreation use, but an extremely large volume of storage would be required if only 85 percent treatment was provided. Due to the heavy water using industries in this area, a higher degree of treatment would be extremely expensive. The use of 760 acres of flood plain lands for additional urban development by 2020 is expected. The city of Tuscaloosa is constructing a large dam and reservoir on the North River tributary of the Black Warrior River for future water supply. This project will have a dependable yield of about 200 mgd which is sufficient to meet the demand until year 2020.

Tombigbee River Basin

The three primary and one secondary growth centers in the Tombigbee River Basin are discussed in the following paragraphs.

Pontotoc-Tupelo-Fulton-Baldwyn

The water related needs of this growth center are primarily for additional flood protection in the adjacent highly agriculturalized areas, and expansion of water conveyance and waste treatment facilities. As in most of Mississippi Appalachia, the future water supply needs can be met by groundwater or surface streams. The reservoir created by the Aberdeen Lock and Dam element of the Tennessee-Tombigbee Waterway will provide a major surface source for future supplies. Floods on Town Creek in the Tupelo area cause an estimated annual damage of $30,440 to urban development and damages to agricultural and other development is estimated to be $712,280 annually. The upstream watershed project on Town Creek by the Soil Conservation Service will reduce the damages by $489,100 annually. Town Creek is an intermittent stream with low flows consisting primarily of untreated waste or lagoon effluent. Reclassification of the stream standard is an alternative to additional treatment or storage for flow augmentation and should be considered. It is estimated that 580 acres of flood plain lands primarily in the Tupelo and Fulton areas will be needed for urban use by the year 2020. Fulton is located on the route of the Tennessee-Tombigbee Waterway. The need for future port facilities at that location is a possibility depending upon industrial growth in the growth area as a whole.

Aberdeen-Amory

This growth center is located directly on the route of the Tennessee-Tombigbee Waterway. Water related needs do exist in this area but they can be provided so as not to become impediments to future growth. Port facilities can be constructed to serve the two urban centers as the waterway is developed and the need becomes apparent. Treatment facilities for municipal waste and additional water supply conveyance for municipal use are needed. Floods on the Tombigbee River in these urban areas, primarily at Aberdeen, cause annual damages of $6,000. The possibility of reducing the flood damages in these areas by levee protection will be given detailed consideration in current and separate studies of the Tombigbee River basin by the Corps of Engineers. Ample flood-free lands are available for expected future development.

Columbus-Starkville-West Point

The primary water use needs in this growth center are flood control and conveyance systems for municipal water supply. Floods along the Tombigbee River and its tributary, Luxapalila Creek, at Columbus cause annual damages to urban development of $563,000. An authorized channel improvement project on the latter stream, now in the advance planning stage, will reduce the urban damages by $218,000. A levee system on the left bank of the Tombigbee River in Columbus being studied by the Corps in a flood control report for the city is estimated to further reduce the annual damages by $150,000. The development of the Tennessee-Tombigbee Waterway will provide the growth center with an economical means of transporting bulk commodities to and from the area. Planning for port facilities in the Columbus area to serve the three populated centers of the growth area should anticipate a need soon after the waterway is completed to further stimulate industrial growth now underway. Also, reservoirs created by the locks and dams included in this waterway project will provide impoundments for raw water supplies. Non-use of the Tombigbee River for water supply in past years (in its undeveloped state) is attributed to high turbidity, pollution from municipal waste, and the presence of other more feasible sources, primarily groundwater. Presently, most municipal waste treatment facilities provide only about 60 to 75 percent OBD efficiency, however, the maintenance of other stream water quality in the area should not be a major problem since a higher degree of treatment is planned. With a strong water pollution abatement program including planning considerations given to water quality parameters, growth and industrial development should reach the projected area's development level. The Mississippi Development Plan details the future development level. Starkville and Mississippi State University are presently discharging treated wastes to headwater tributaries in three different watersheds. Low flows in these streams are primarily treated wastes. Yellow Creek is suggested as a reservoir site for water quality control. The Buttahatchie River may be a more suitable stream and site for this purpose. The stream will supply water to the pool formed by the Columbus Lock and Dam which is expected to receive the majority of the industrial wastes in the "Golden Triangle Area." Some need is anticipated with continued industrialization and low flow augmentation could be provided from reservoir storage on Luxapalila Creek, or its

tributary, Yellow Creek. It is estimated that 1,270 acres of flood plain land will be needed adjacent to the waterway and for commercial, industrial and residential development in other areas by 2020.

Fayette-Vernon-Hamilton

This secondary growth area has water related needs for storage and conveyance systems for water supply primarily for the urban areas of Fayette, Winfield, Guin, Sulligent, Vernon and Hamilton. Rural areas serving these centers have need for flood control improvements for reducing damages to agricultural developments. The immediate future demand for water supply until about 1980 for Guin and Winfield will be met by storage in the USDA's upstream watershed project on Luxapalila Creek. The USDA is also planning similar improvements on on Sipsey Creek to meet these needs in the Fayette area. The shift from groundwater supplies in the Sulligent and Hamilton centers to stream flow sources or a significant increase in groundwater development is needed to provide future demands. The water supply and water quality control demands in this growth area can be met by impoundment of the Buttahatchie River in the vicinity of Hamilton and a multi-county conveyance system. Recent manufacturing employment gains in this growth area should be maintained by treatment of waste and storage for low flow augmentation as may be needed in the future. Flood damages on the Buttahatchie and Sipsey Rivers and Luxapalila Creek are estimated to be $628,000 annually. The planned improvements on Luxapalila Creek by the Corps and the Soil Conservation Service will provide a reduction of $302,000 in damages along that stream. Major channel improvements authorized for construction by the Corps of Engineers on the Buttahatchie and Sipsey Rivers will further reduce these damages to $117,000. A minor need for additional flood plain lands for urban use by 2020 is expected but, in conjunction with planned flood control improvements in this area, flood hazard information should be made available for setting up a program for the proper use of flood plain funds.

Other River Basin Areas

Part of the Savannah and Tennessee River Basins and streams in northeast Mississippi are located in Sub-region E.

Savannah River Basin

Since the sub-region boundary follows the Georgia-South Carolina State Line along the Chattooga and Tugaloo Rivers, part of the headwaters of the Savannah River Basin lies within Sub-region E. In this part of the sub-region the Toccoa-Cornelia-Clarksville area has significant potential for future economic growth.

Toccoa-Cornelia-Clarksville

Of the urban centers, only Toccoa is within the Savannah River Basin, but the others located in the Chattahoochee River Basin

are dependent on tributaries of the Tugaloo River for meeting future water supply needs. The water use needs of Toccoa are related primarily to the expansion of existing waste facilities and the development of an additional municipal water supply conveyance system. Since the urban area is located well above the Tugaloo River flood plain, flood control and land development needs are practically non-existent. It appears that expansion and economic growth in the area is hampered by inadequate water supply. The present source of municipal supply, Toccoa and Panther Creeks, are being taxed to their capacity and it appears that a new pumping plant on the Tugaloo River should be considered. Such a plant should be sized to provide about 12 mgd which would meet the needs until the year 2020. Treatment of municipal industrial waste loadings to 85 percent effective in BOD removal should be adequate to maintain acceptable standards in the Tugaloo River downstream of Toccoa. The Cornelia-Clarksville portion of the growth center which also includes Domorest is located in the extreme headwaters of the Chattahoochee River Basin. Flood damage in the urban centers is rather small but damage in adjacent rural areas in tributaries of the Chattahoochee River (Soque River and Hazel Creek) are significant and bear directly on the area economy. Flood damages in these two watershed areas amount to $90,000 annually. It is expected that about 180 acres of flood plain lands in the growth center will be used for urban expansion during the 50-year study period. The water supply demands of the growth center are presently being provided by area streams with some impoundment on Hazel Creek and additional storage could be planned on the Soque River now authorized for planning by the USDA. Presently each community in the growth center plans individually for its water supply needs and present sources will be inadequate by about 1990. A shift to centralized distribution may be necessary for future planning to meet the needs. The estimated demand at year 2020 of 10 mgd is expected to create needs above 1990 of about 5 mgd. Planning to meet these needs should consider the diversion of storage in Lake Burton on Tallulah River, a tributary of Tugaloo River, via the Soque River for use in the growth center. Since the growth center is located about 20 miles upstream from the headwaters of Lake Sidney Lanier, no pollution problems are foreseen, provided treatment of all municipal and industrial waste loadings to 85 percent effective in BOD removal is accomplished. However, considerable expansion of waste treatment facilities will be required in order to maintain this level of treatment until 2020.

Tennessee River Basin (Hiwassee River Tributary)

Since the northern boundary of the sub-region follows the Tennessee-North Carolina and Georgia State Lines, a small part of the Tennessee River Basin in Georgia lies within Sub-region E. There are no growth centers identified in this area and its future economic activity appears to be related to the recreation and tourism industry. Presently many of the residents in this area are employed at Copper Hill, Tennessee, where the Tennessee Copper Company mines and smelter plant are located, and some commute to Atlanta and Marietta where automobile

and aircraft plants and other industry offer employment opportunity. This rather mountainous area includes three Tennessee Valley Authority reservoirs which have a combined area of about 14,500 acres at full pool (Chatuge, 7050; Nottely, 4180; and Blue Ridge, 3290). Blue Ridge is a single-purpose power project which TVA acquired from Tennessee Electric Power Company in 1939. The other two were built by TVA in 1942 and were designed primarily for flood control and power. Although seasonal drawdown on the projects can be substantial, only a minor part of this drawdown normally occurs during the prime recreation season (June-Labor Day). In recent years, the planned rate of drawdown for Chatuge and Nottely during this season has been reduced to provide better recreation opportunity. Except in dry years, if the three projects have an acreage of 11,000 on June 1, they should still have about 9,000 on September 1. The minimum pool, which occurs outside the recreation season, is about 2,000 acres. The Chattahoochee National Forest in this area also has capacity for expanding existing and developing additional outdoor recreation areas. Annual flood damage in four of the USDA watershed projects in this portion of the sub-region amount to about $61,000.

Mississippi Area Streams

The needs and water resource alternatives for the north and western portions of Appalachian Mississippi, excluding the Tombigbee River Basin portion of the sub-region, are discussed in the following paragraphs.

Corinth-Booneville-Iuka-Tishomingo

This growth area is located in the northeastern portion of Appalachia Mississippi and contains three urban centers. Iuka is located in the Tennessee River Valley near the route of the Tennessee-Tombigbee Waterway and Corinth and Booneville are in the Hatchie River Basin area. Although Corinth is situated in the headwater portion of the drainage basin, backwater flooding from the Tuscumbia River, a tributary of the Hatchie, is a problem. The other urban centers are also situated high in the basin drainage areas, and since present development is above the flood plains they are not currently affected by river-type flooding. Agricultural and other damages in the four watershed areas of streams of the Hatchie River Basin area (the authorized West Hatchie River and Tuscumbia, Muddy and Grays Creeks Upstream Watershed Projects) amount to about $1,044,000 annually. The urban centers are projected to substantially increase in areal size and about 410 acres of flood plain lands are expected to be used for this expansion. Due to an abundant groundwater source for water supplies, no problems are foreseen in meeting the water supply demand of 44 mgd by the year 2020. Augmentation of stream flows for maintenance of water quality in this area is not deemed necessary due to the high degree of treatment planned on the local level.

A study of the Hatchie River Basin is presently underway, with completion scheduled in FY 1971. As a part of the basin study,

a reservoir site on the Hatchie River west of Corinth for flood control and recreation is being investigated, but the studies are not sufficiently advanced to reach any conclusions at this time. Flood damage reductions in Appalachia would be primarily rural; however, recreational development would benefit the projected growth in the Corinth area.

No river terminals, either public or private exist along the Tennessee River near this growth center. A public port facility here would provide an opportunity for this growth area to benefit from Tennessee River transportation and serve as an attraction to new industry. Industrial development related to such a port would be an important stimulus to growth in the area.

Holly Springs

This growth center is located in the drainage divide area between the Coldwater and Little Tallahatchie Rivers. A good portion of the growth area is within the Holly Springs National Forest. The urban area is not affected by river-type flooding. However, agricultural and other type damages in the rural areas of 13 authorized upstream watersheds of the two river basin areas amount to about $1,106,000 annually. The future urban land development needs in Holly Springs growth center can easily be met without encroachment on flood okaub areas. The water supply demand of about 14 mgd by the year 2020 can be met from groundwater sources and the maintenance of stream water quality in this area should be accomplished through treatment of waste loadings at their source.

Other

In the headwaters of the Yalobusha River near Pontotoc and Houston, the USDA has investigated the Upper Skuna River and Fair Creek Watersheds and found that annual flood damages of about $78,000 are experienced in agricultural and rural areas. Also, the USDA has investigated the Tallahuga Creek Watershed in the headwaters of the Pearl River Basin near Louisville and found that annual flood damages in this rural area amount to about $91,000.

The upper reaches of the Big Black River were investigated as a part of an overall Comprehensive River Basin Study of the Big Black River Basin under other authority. The major water resource related needs that were found to exist in the upper Big Black as well as the entire basin were for flood prevention on the main stem and in the tributary watersheds and for additional water-oriented recreational development. A portion of this need can be met by implementation of the comprehensive plan developed by the USDA in the Big Black River report. Watersheds included in the comprehensive plan that fall in Sub-region E include Spring Creek, Little Black Creek, Big Bywy Ditch, Calabrella Creek, and Wolf Creek. Structural measures recommended in these watersheds include 25 floodwater retarding structures, 2 multiple-purpose

structures for flood prevention and recreation, and approximately 150 miles of tributary channel improvement. The remaining flood problems in Webster and Choctaw Counties are primarily rural in nature and should be identified by future flood plain information reports as recommended in the Comprehensive Study for the Big Black River Basin.

The needs discussed in the paragraphs above are those that are identified with specific growth centers. It is estimated that water resource related needs that will occur in those portions of the sub-region that are not associated with specific growth centers previously discussed will amount to about 230 mgd for water supply; about 69,600 acre-feet per year for water quality improvement; and for water-oriented recreation, 62,290,000 recreation days per year. It is also estimated that about $15.77 million of non-urban flood damage occurs in the sub-region each year. Portions of these needs will be satisfied by the projects that are being considered in connection with the specific growth centers described above.

11. NON STRUCTURAL

Non-structural measures for reducing flood damages include flood plain management programs and flood warning systems. An active program of flood plain information studies accompanied by flood plain zoning and management policies should accompany any structural water control plan. Alert action based on sound hydrologic and hydraulic studies can guide the development potential, minimize the unwitting encroachment into areas of high risk flooding hazards and promote wise land use policies. Flood warning services provided by the U.S. Environmental Services Weather Bureau assist in reducing damages and hazards to health and life caused by floods. These services, which are provided for all major rivers in Sub-region E, afford opportunities for evacuating residents, livestock and personal property from the flood plains prior to inundation.

Alternatives that were considered for meeting the growth center needs also included the possibility of non-structrual measures. In Atlanta substantial data on flood hazard zones in the metropolitan area is being collected and flood plain information reports on about 34 of the area streams, in addition to 11 completed reports, are being prepared by the Mobile and Savannah Districts of the Corps of Engineers. TVA has also prepared two flood plain information reports. The mapping and delineation of flood plain areas downstream of existing Corps of Engineers' reservoirs is standard practice. A report of this nature for the area below Buford Reservoir is available and one on the area below West Point is nearing completion. Also, a flood plain information report on the area below Allatoona Reservoir is planned. These reports, which are made available to the general public, provide guidelines for appropriate use of flood plain lands. This type of information related to major reservoirs on the Coosa River by the private power company is needed to effectively plan for future urban growth along the main stem, including the Gadsden, Childersburg and Wetumpka areas. A program of flood plain management services has been initiated for the Birmingham urban area with mapping and delineation of flood hazard areas

the prime effort at the present time. Additional urban expansion into the flood plain area of the Black Warrior River at Tuscaloosa is expected, and additional mapping and flood data are needed for planning the expansion in this area. These type data are also needed for the Cornelia-Clarksville, Georgia, and Corinth-Booneville-Iuka, Mississippi areas.

Non-structural means of minimizing water quality and quantity problems are important components of any effective water management plan. The combined Federal and state program for establishing and controlling water quality standards will contribute to the wise use of this resource. Technological components in treatment systems, in reuse of closed cycle process in industrial plants and other applications promise gains for both quality and quantity problems.

These and other relevant non-structural alternatives have been carefully considered in the development of the comprehensive water resource plan.

SECTION IV - EVOLUTION OF THE SUB-REGION WATER RESOURCE DEVELOPMENT PLAN

12. SELECTION OF BEST SOLUTIONS

Water resource needs for the growth centers in Sub-region E have been described in Section II. Section III describes the probable sources for meeting those needs that are specific in nature: flood control, water supply, water quality control and navigation. Those needs that are widespread in nature, including outdoor recreation, fish and wildlife, hydroelectric power and conservation were not discussed in Section III nor in the paragraph which deals with specific need of growth centers. Rather, they are reviewed in paragraph 13 which concerns itself with the water sub-region as a whole.

Certain assumptions have been made in order to facilitate selection of the best apparent plan for providing the needs. These are: (1) development of presently authorized projects will continue; (2) water supply requirements sufficient to meet the demand to 1980 will be provided or contracted for by states or municipalities prior to that time (except for Dalton, Georgia); and, (3) minimum releases from all reservoirs would be equal to inflow, if needed.*/ Existing, authorized, and potential projects, whether developed by the Corps of Engineers, Department of Agriculture, state, city, or public utility, have been considered. Non-structural alternatives have also been given consideration in the derivation of this plan. The remainder of paragraph 13 is primarily confined to navigation and to water supply, water quality control, and flood control needs for identified growth centers. The material is presented by river basins.

Chattahoochee River Basin

The only major Appalachian growth center in this basin is Gainesville, Georgia; however, Atlanta proper is located just outside of Appalachia, largely in the Chattahoochee River Basin, but Gwinnett County, in the Atlanta SMSA, is located in Appalachia. Two secondary growth centers, Dahlonega and Douglasville, have also been identified in this basin. Progressing downstream from the headwaters of the basin, the growth centers are Dahlonega, Gainesville, Atlanta and Douglasville.

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*/ To meet riparian obligations. For purposes of this study it has been assumed that the recorded natural low flow would be available for use by all riparian owners.

Dahlonega

As discussed in Section III the water resource needs of Dahlonega are rather small and the only project expected to bear on the economy of this area is the USDA's recommended Tesnatee Creek upstream watershed improvements including 7 small reservoir structures containing 7,332 acre-feet of flood storage and 49 acre-feet of water supply storage for users to the northeast of the Dahlonega urban center. Annual flood damages in the area are estimated to be about $40,000. The Tesnatee Creek watershed project will reduce these losses $27,000. Residual damages of $13,000, largely rural in nature, are not deemed practicable for further reduction. Future urban expansion is estimated to require 980 acres of land, all of which may be located well above the flood plain areas. However, a flood plain information-type study is needed to assure that these lands would not be part of the flood plain of the Chestatee River. The new Appalachian Highway (Corridor A, see Figure 9-3) will traverse the area providing much needed access to and from other regions.

Dahlonega's water supply demand of 5 mgd by the year 2020 can easily be met by available stream flow. The minimum flow (26 October 1941) of the Chestatee River at Dahlonega is estimated to be about 30 mgd. No problems are foreseen in the maintenance of stream water quality.

Gainesville

The water resource needs of the Gainesville area are provided primarily by the existing Buford Reservoir. The major flood control needs of the Chattahoochee River and tributaries above Gainesville and the Buford Reservoir are in upstream watershed areas. Existing USDA watershed projects (Sautee and Hazel Creeks) and the recommended Tesnatee Creek watershed project expected to be installed by 1980 provide for the immediate flood control needs, and the potential Wahoo-Little River watershed project is capable of meeting additional needs. Flood damages in these upstream watershed areas of $101,600 annually are reduced by $51,000 with existing or planned projects and an additional reduction of $22,400 annually could be accomplished by development of the Wahoo-Little River project. Flood storage in these projects amounts to 18,092 acre-feet. Urban encroachments on the flood plains of minor tributaries in the Gainesville area, which would be susceptible to significant damages, is a possibility that could be avoided by timely application of flood plain management techniques and the development of a municipal storm drainage system.

The water supply needs until 2020 for Gainesville can be provided by storage in Lake Sidney Lanier (Buford Dam Reservoir). Existing water and waste treatment facilities in the Gainesville area will require expansion for future growth needs. A small portion of the growth centers municipal wastes after secondary treatment are diverted

into tributaries of the Oconee River. This practice results in minor pollution of tributaries of the Oconee River. Intensification of the problem as a result of future urban growth can be expected unless a higher degree of treatment of the anticipated waste loadings is provided.

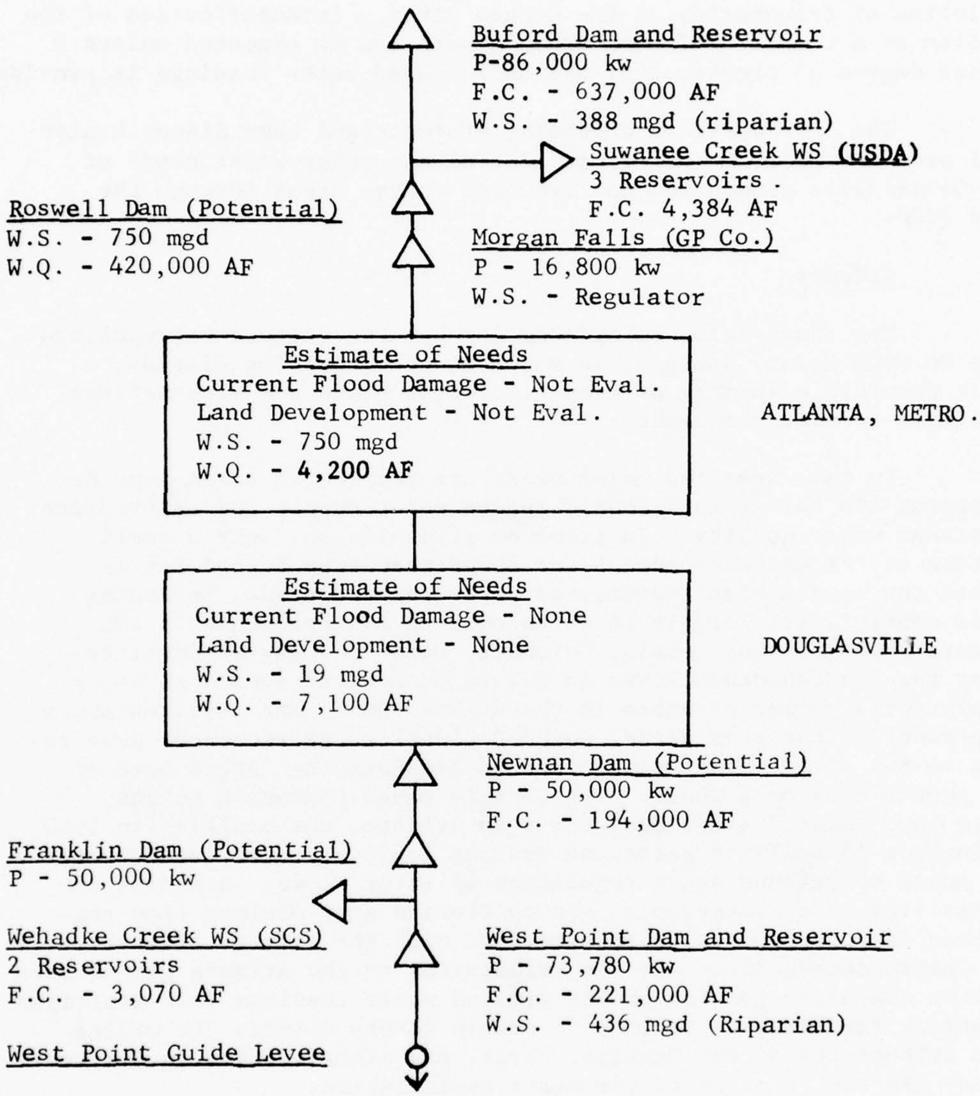
The four upstream watershed projects and Lake Sidney Lanier will provide the principal flood control and other water needs of the Gainesville growth and contributing center areas through the year 2020.

Atlanta

The reach below Buford Dam through the Atlanta metropolitan area to West Point, Georgia, is shown in the following diagram, which provides a summary of specified water needs and alternatives available to meet the needs.

In this area the major needs are related to urban land development (in the Atlanta SMSA), future water supply and maintenance of stream water quality. In terms of river length, only a small portion of the Chattahoochee River downstream from Buford Dam is within the Appalachian Region; the water related needs, including flood control, are largely in areas outside of Appalachia in the Atlanta SMSA (Fulton, DeKalb, Gwinnett, Cobb and Clayton Counties). Since the Chattahoochee River is now an economical source of water supply for a number of users in the Atlanta SMSA, and provides about 70 percent of the area needs, any additional water resources development on the river above Atlanta should consider the future need of the growth area as a whole. The Georgia Power Company's Morgan Falls Dam, about 7 miles upstream from Atlanta, was modified in 1960 to include 16 spillway gates and provide 3,200 acre-feet of storage for power operations and reregulation of river flows, including releases from Buford Reservoir, and to provide some minimum flow regulation in accordance with an agreement with the city of Atlanta. The Chattahoochee River and its tributaries in the Atlanta growth area receive the major portion of the treated waste loadings from municipal treatment facilities. Decatur in DeKalb County diverts its wastes into tributaries of the Ocmulgee River, and other suburbs in Clayton County use the Flint River for waste assimilation.

To provide the future needs of the basin below Buford Dam, the reallocation of storage in Lake Sidney Lanier and the reregulation of power releases was considered to minimize stream bank erosion and provide a more constant and larger volume of flow in the Chattahoochee River in the vicinity of Atlanta. Investigations indicated that this was not economically feasible at this time. Reallocation of storage in sufficient amount to provide both water supply and water quality control needs in the area would seriously impair the project's capacity for power generation. Utilizing the total presently allocated power storage of 1,049,000 acre-feet in the Buford Reservoir for future water



CHATTAHOOCHEE RIVER DOWNSTREAM FROM BUFORD DAM

supply and water quality control purposes, only the water supply needs at 2020 could be provided. The water quality control needs of 420,000 acre-feet would require utilization of about one-half of the dead storage below the present minimum power pool level. Operation of the project to meet this level of needs would, in addition to preemption of its power generating capacity, reduce the project's present large recreational use to minimal proportions.

A more practicable solution for meeting the 2020 needs for water supply and maintenance of stream water quality below Atlanta may be an additional storage structure downstream from Buford Dam. A degree of municipal and industrial waste treatment at their sources equivalent to 90 percent BOD removal would be necessary to assure the project's effectiveness in meeting the needs to 2020. A dam on the Chattahoochee River at mile 318.8, the Roswell site, with the upper pool at elevation 915 which is the normal tailwater level at Buford Dam, would have the capability of meeting the Atlanta growth center's water supply and water quality control needs of 750 mgd and 4,200 acre-feet per year, respectively. These volumes are about 70 percent of the total need of the growth center, since it is assumed that about 30 percent of the future needs will be provided by contributing streams of the Chattahoochee River and Allatoona Reservoir. The development of the Roswell site would inundate 8,100 acres of the Chattahoochee Valley below Buford Dam, but this loss of land potentially developable for urban uses would not preclude future urban expansion of the Atlanta area since other lands are available for that purpose.

An evaluation of the future needs for urban land to accommodate Atlanta's growth has not been made for this report since the major expansion is expected to occur outside the Appalachian Region. Rapid expansion of the Atlanta SMSA in recent years has resulted in substantial encroachments on the flood plains of streams in the area such as the Chattahoochee River and some of its tributaries and headwater streams of the Flint and Ocmulgee Rivers. A program is now underway to develop flood plain maps and information for streams in the Atlanta area for use by local interests as a guide in the proper development of lands subject to flooding and thus reduce potential future flood damages. A portion of all of about 45 streams are included in the Atlanta area program, of which flood plain information reports have been completed for 11 streams.

Substantial flood protection along the Chattahoochee River from Buford Dam to Atlanta and, to a lesser extent, farther downstream is provided by flood storage in the Buford project. The effectiveness of Buford Dam in reducing the stage of a 50-year flood downstream to the Atlanta area has been depicted in a preliminary flood plain information report prepared by the Corps of Engineers which has been made available to local interests. Floods along Suwanee Creek, a tributary of the Chattahoochee River in Gwinett County, cause annual rural-type damages of $58,387. The USDA has a watershed project planned which will reduce these damages by $53,480. Residual flood damages along the Chattahoochee River, after the West Point Dam is placed in operation at West Point, Georgia and nearby urban centers

downstream to Columbus, Georgia, are estimated at $24,000 annually. These residual damages could be reduced with flood storage at the potential Newnan dam site. This site and the Franklin site also have a potential for an installed capacity of 100,000 KW for power generation and for providing about 23,050 acres of water surface area for recreational use, assuming the quality of water below Atlanta in the Newnan Reservoir area is restored to acceptable levels. Annual damages of $24,000 to existing urban development on the right bank of the Chattahoochee River at West Point and Lanett, Alabama, could essentially be eliminated by a potential levee and floodwall system which would begin at the north end of the Corps of Engineers' existing guide levee, parallel this levee 1,700 feet, then extend downstream about 8,500 feet to tie to high ground. The levee system would provide protection for little, if any, undeveloped land for future urban expansion. Flood damages of $8,700 annually on Wehadke Creek which flows into the West Point Reservoir in Troup County, Georgia, can be reduced by $6,800 with the potential upstream watershed project for this stream which has been investigated by the USDA.

The existing project for navigation on the Chattahoochee River provides a 9-foot deep channel from its mouth upstream to Columbus, Georgia. There is a potential for navigation on the river upstream from Columbus to Atlanta. In order to provide a 9-foot deep channel in this reach of the river, the construction of three locks and dams and the installation of locks at five existing dams would be required. Development of a plan for navigation from Columbus to Atlanta is being considered in studies in the Mobile District under other authority. This report is planned for completion in late 1970.

Douglasville

This growth center is dependent on the Chattahoochee River for its future water supply (acuqisition from the Cobb County-Marietta system) and tributary streams for waste assimilation with ultimate return to the Chattahoochee River.

Since the Douglasville growth center in its entirety is generally located on high ground, future use of flood plain lands for urban expansion to a significant degree is unlikely. Also, plans have been made to purchase treated water from the Cobb County-Marietta Water Authority to supply the foreseeable needs of the immediate future. Additional waste treatment to Douglasville is needed for maintenance of the water quality of Sweetwater Creek, a tributary of the Chattahoochee River which is the source of raw water for East Point, Georgia, a suburb of Atlanta. This stream, which flows through Austell, Georgia, in the Cobb County portion of the Atlanta SMSA outside the Appalachian Region, is also polluted by wastes from that city. Full treatment of these wastes will also be required to maintain the water quality of the creek and preserve the source of supply for East Point.

Summary

The two upstream watershed projects and the Roswell, Newnan and Franklin Reservoirs, in conjunction with municipal waste treatment facilities and the Corps of Engineers flood plain information program now underway, would provide the future flood control and water supply and quality needs of the Atlanta and Douglasville growth centers. These projects would also provide part of the basin's future power and recreation needs. The existing West Point Dam (under construction) and the potential Newnan and Franklin Dams could be modified to include lock facilities when extension of navigation on the Chattahoochee from Columbus to Atlanta is warranted.

Upstream watershed projects completed or approved for installation in the Chattahoochee River Basin (See Figure 10-9) include the following:

Location Number	Name of Watershed	State
3	Hazel Creek	Georgia
7	Sautee Creek	Georgia
55	Suwanee Creek	Georgia
56	Tesnatee Creek	Georgia

The Tesnatee Creek watershed project provides flood control and other water and land resource needs indirectly related to the Dahlonega growth area. Similar purposes provided by the Sautee, Hazel and Suwanee Creeks are identified largely with the needs of the Gainesville growth center contributing areas.

Alternative watershed projects available for planning include:

Location Number	Name of Watershed	State
37	Wehadke Creek	Alabama
62	Wahoo-Little River	Georgia

These watershed projects have been planned to meet flood control and other water and related land resource needs on streams contributing to the Buford and West Point Reservoirs. Water supply storage in the Wahoo-Little River Watershed project would meet needs of Clermont, Georgia, which is presently supplied by the city of Gainesville.

The foregoing discussion of structural alternatives, excluding the USDA upstream watershed projects, is based on studies now underway in the Mobile District. These studies, which have been in progress several years, have determined that pollution problems in the Chattahoochee River and water supply at Atlanta and downstream areas are of such proportions that extensive investigations by other agencies, Federal, state and local, are required before detailed planning to meet these needs can be accomplished. This report, therefore, does

not include a detailed quantitative and qualitative analysis of all the water and related land resource problems of the Chattahoochee Basin area and possible solutions, particularly as they relate to the Atlanta SMSA. However, it does give an indication of the relative magnitude and extent of the problems in that area.

Basin Plan

The plan of development of water resources in the Chattahoochee River Basin includes the following:

Projects in operation or expected to be in place by 1980:

Corps of Engineers

Buford Dam, Georgia
West Point Reservoir, Georgia and Alabama
West Point, Georgia Guide Levee and Channel Improvement

USDA Upstream Watershed Projects

Hazel Creek, Georgia
Sautee Creek, Georgia
Suwanee Creek, Georgia
Testnatee Creek, Georgia

For authorization:

USDA Upstream Watershed Projects

Wahoo-Little River, Georgia

For continuing planning:

Corps of Engineers

Roswell Reservoir, Georgia
Newnan Reservoir, Georgia
Franklin Reservoir, Georgia
West Point Levee, Georgia
Navigation - Columbus to Atlanta, Georgia

USDA Upstream Watershed Projects

Wehadke-Creek, Alabama

Non-structural

Flood Plain Information Studies at:

Dahlonega, Georgia
Gainesville, Georgia

Continuing Studies

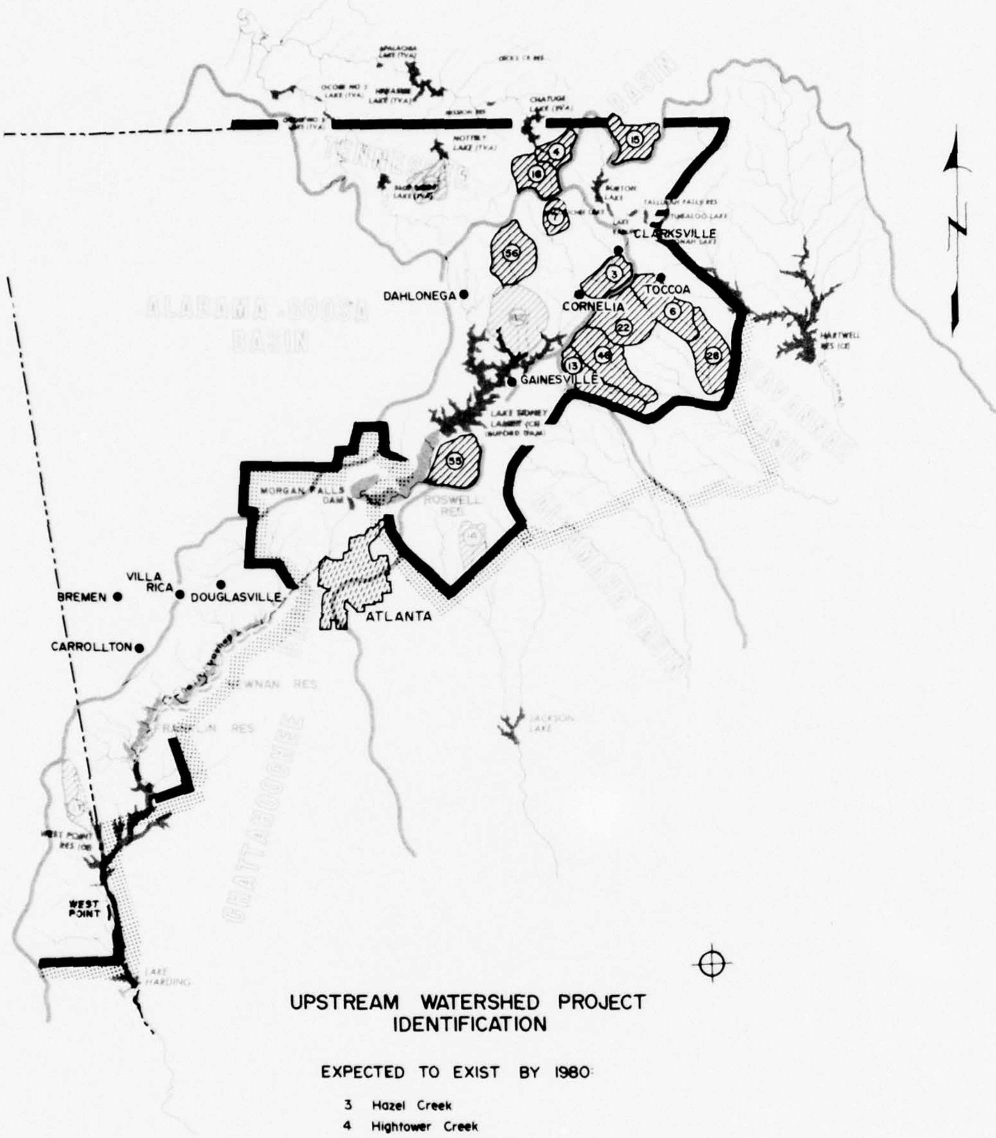
Since studies authorized by Congress of the Chattahoochee River Basin area will include the feasibility of navigation to Atlanta as well as other water resource needs, additional authority for study of this basin is not needed.

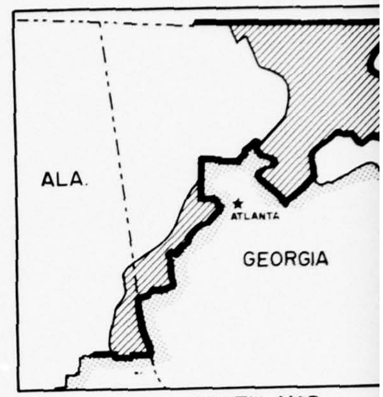
Table 10-12 shows the effectiveness of the selected plan in satisfying the flood control and other water use needs of the growth centers. A map and schematic diagram of the various alternatives considered are shown on Figure 10-9.

TABLE 10-12
EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN
CHATTAHOOCHEE RIVER BASIN, WATER SUB-REGION E

Item	Needs	Buford Storage Reallocation	Roswell Reservoir	Newman Reservoir	Franklin Reservoir	Wahoo-Little River USDA	Unmet Needs	Indicated Future Studies
Water Supply (mgd)								
Atlanta	750[a]	290[b]	750[a]				0	
Douglasville	19	4[b]	19				0	
Water Quality (1,000 ac. ft.)								
Atlanta	4.2		4.2				0	
Navigation (1,000 tons)	4,569			(Lock)	(Lock)		4,569	Detailed evaluations in progress under separate authority.
Flood Control (current damages - $1,000)								
Dahlonega	12.9[c]						12.9	Flood plain mgt.
Gainesville	29.1					22.4	6.7	
Atlanta	Not Evaluated							Flood plain mgt. program now in progress.
Flood Control (future land use in flood plain - acres)								
Dahlonega								Flood plain mgt.
Gainesville	180						0	
Atlanta								Flood plain mgt. program now in progress.
Recreation Days (Total Basin) (1,000's)	18,220		1,375	4,480	1,860		10,505	Reservoirs on tributaries of Chattahoochee River and Parks.
Performance Index (National)		d/	d/	d/	d/	1.3		
Performance Index (Regional)		d/	d/	d/	d/	1.3		

a/ Includes 19 mgd for Douglasville.
b/ These needs to 1980 would be assignable to the Roswell site thereafter.
c/ Residual damage when watershed projects are completed.
d/ Studies now in progress for Chattahoochee River Basin will establish the index.





VICINITY MAP

LEGEND

APPALACHIAN REGION BOUNDARY

RIVER BASIN BOUNDARY

WATER SUB-REGION E BOUNDARY

EXPECTED TO EXIST BY 1980:

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

LOCK

WATERWAY

UPSTREAM WATERSHED PROJECT IDENTIFICATION

EXPECTED TO EXIST BY 1980:

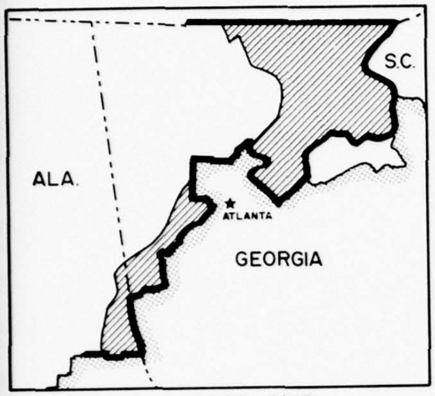
3 Hazel Creek
4 Hightower Creek
6 North Fork Broad River
7 Sautee Creek
13 Grove River
15 Head of Little Tennessee River
16 Hiwassee River
22 Middle Fork Broad River
28 North Broad River
46 Hudson River
55 Suwanee Creek
56 Tesnatee Creek

ALTERNATIVES AVAILABLE FOR PLANNING

14 Haynes Creek-Brushy Fork
37 Wehadkee Creek
62 Wahoo-Little River
63 Young Cane Creek

CHATTAHOOCHEE RIVER BA
GEORGIA AND ALABAMA

LOCATION MAI



VICINITY MAP

LEGEND

APPALACHIAN REGION BOUNDARY

RIVER BASIN BOUNDARY

WATER SUB-REGION E BOUNDARY

EXPECTED TO EXIST BY 1980:

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

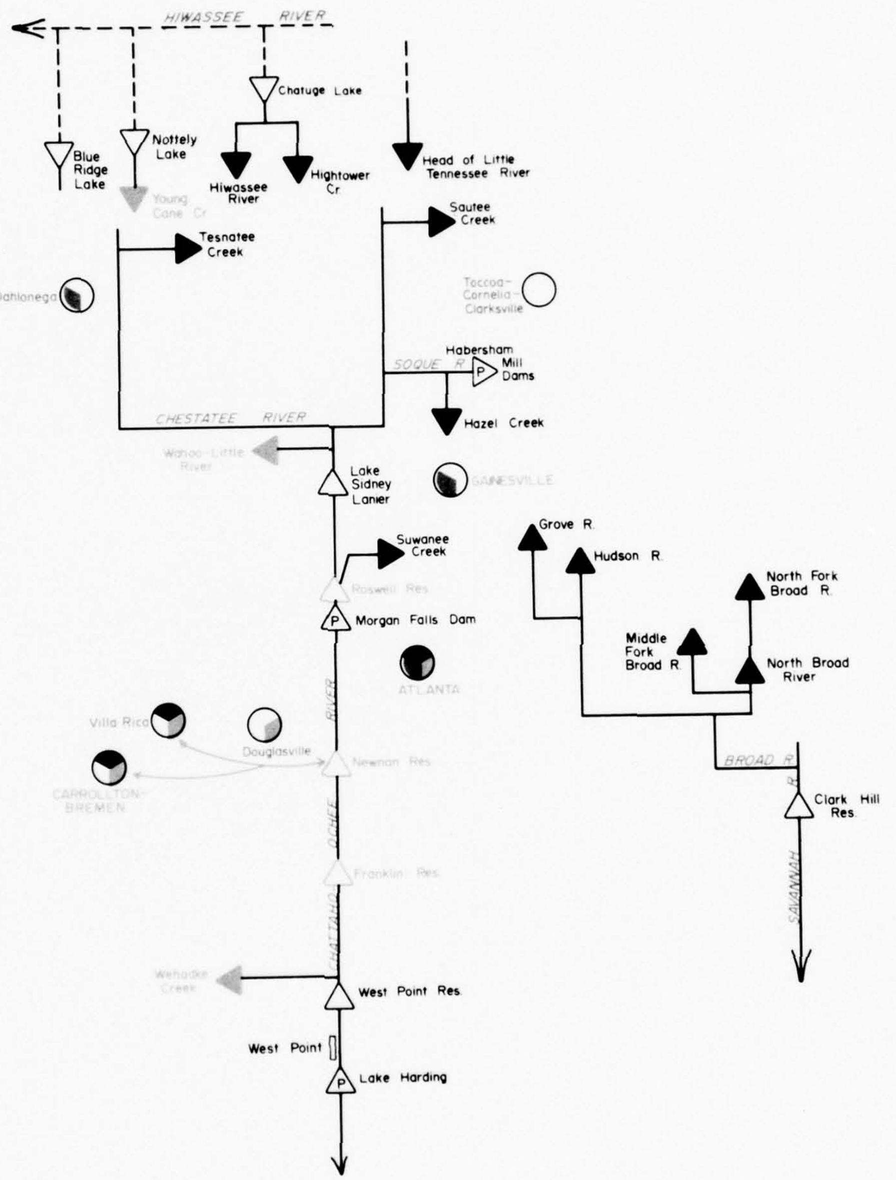
PLANNING ALTERNATIVES

MAJOR RESERVOIR

UPSTREAM WATERSHED PROJECT

LOCK

WATERWAY



WATER QU

WATER SUP

FLOOD CON

EXPECTED TO

MAJOR RE NON-FE

UPSTREAM

LPP PROJ

PLANNING ALTE

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CHATTAHOOCHEE RIVER BASIN
GEORGIA AND ALABAMA

LOCATION MAP

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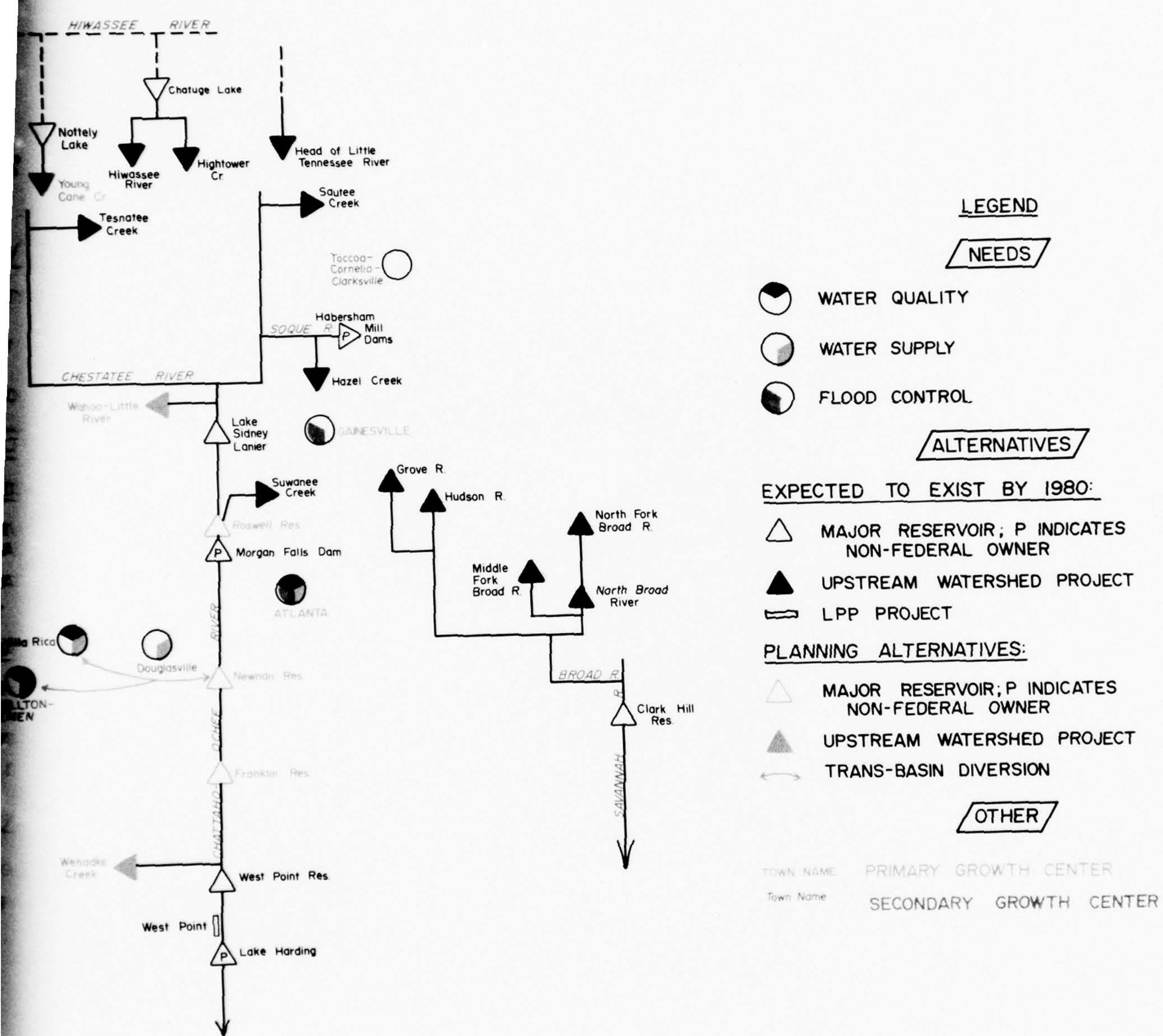

CHATTAHOOCHEE RIVER BASIN
GEORGIA AND ALABAMA

SCHEMATIC OF WATER NEEDS AND ALTERNATIVE SOLUTIONS

II-10-83 FIGURE 10-9

3

Alabama-Coosa River Basin

Major growth centers located in the Alabama-Coosa River Basin have water related needs ranging in magnitude from critical to minor proportions when viewed as impediments to future economic growth. Starting in the headwaters in north Georgia and proceeding downstream, the larger centers are Dalton-Calhoun, Rome and Carrollton-Bremen in Georgia and Gadsden, Anniston, Talladega and Wetumpka (Elmore County) in Alabama. The smaller growth centers of the basin are: Cartersville, Cedartown-Rockmart, Summerville and Villa Rica, all in Georgia.

Dalton-Calhoun

The relative location of the growth centers and the existing and potential units of development from which specified water related needs for the reach of the basin, Conasauga and Coosawattee Rivers above Calhoun, Georgia, can be met, are shown in the following diagram.

The urban area at Dalton extends into the flood plain of Mill (Whitfield County) and Coahulla Creeks and future urban expansion into the Conasauga River flood plain could also occur. Flood control improvements have been made in Mill Creek watershed in Whitfield County under PL 566 by the USDA (SCS). The improvements include 6 flood retarding structures and 2 multi-purpose water supply structures. The 1,048 acre-feet of water supply storage is used to augment flow in Mill Creek at the city of Dalton's water intake. The USDA, as part of the investigations for this report, has also studied the Mill Creek watershed which is located in the Murray County portion of the Dalton growth center. The watershed plan consists of five reservoir structures containing 757 acre-feet of flood control storage and about nine miles of channel improvements. The two Mill Creek upstream watershed projects have been carefully considered in the development of plans for meeting the water use needs of the Dalton growth center. A plan was developed by the USDA for the Coahulla Creek watershed (Tennessee portion, only) which is in Sub-region J and is reported in Appendix A of the Appalachian Report. A plentiful supply of developable lands not subject to flooding is available for future urban expansion at Dalton. Intensive use of the proposed Dalton Reservoir area should be restricted through early option or acquisition by the construction agency. It is expected that, in keeping with current policy, the Corps of Engineers would furnish local interest a flood plain map of areas below the dam along the Conasauga and Oostanaula Rivers which would be affected by flood storage in the reservoir. These data would provide a basis for setting up a flood plain management program along the streams. Significant planning on the local level for adequate urban storm drainage will also be needed. Detailed data on the needs and plans for development in this area are given in Chapter 8, Part III of this report.

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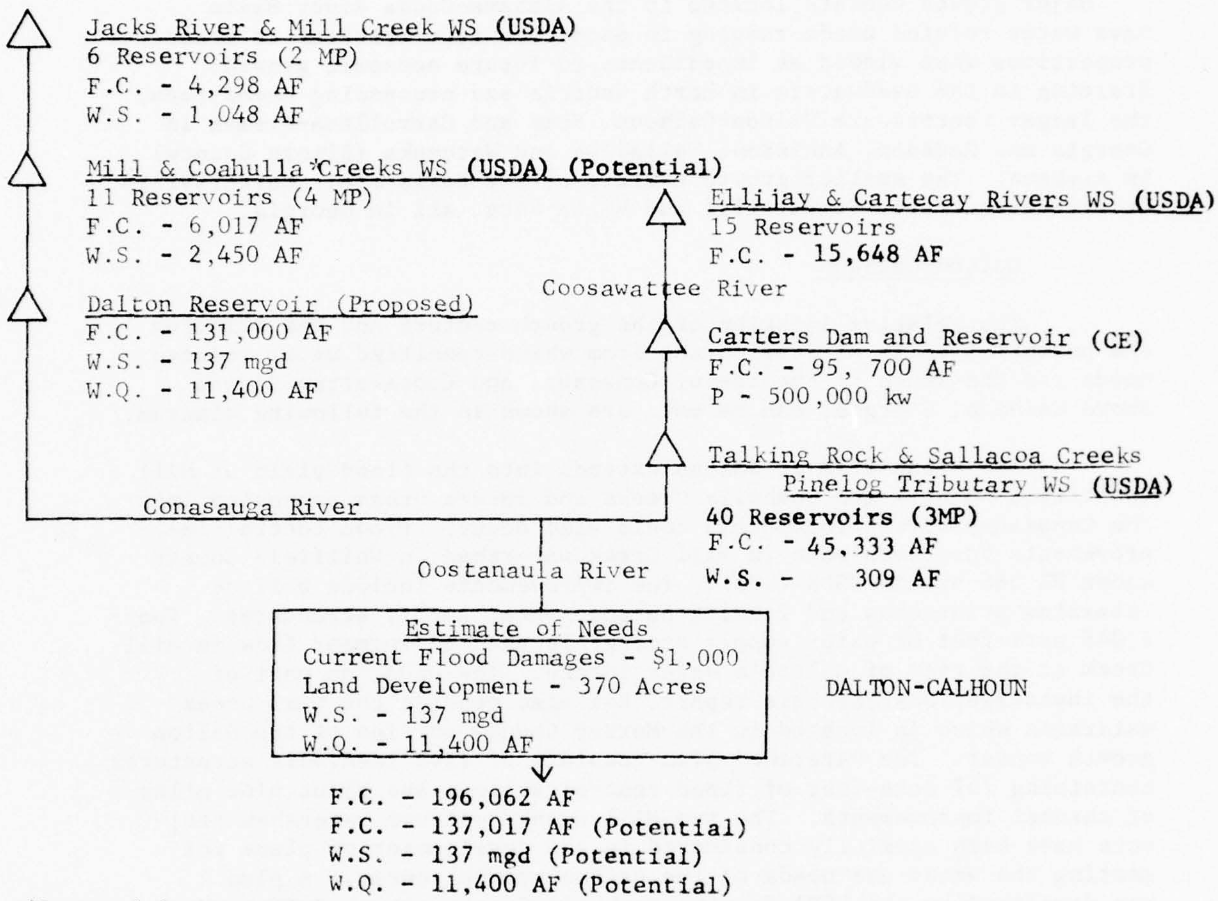


*Located in Water Sub-region J.

CONASAUGA AND COOSAWATTEE RIVERS ABOVE CALHOUN, GEORGIA

The urban area at Calhoun extends into the flood plain of the Oostanaula River. Partial protection of flood plain lands in this urban area will be provided by the Carters Reservoir upstream on the Coosawattee River. With the development of the proposed Dalton Reservoir, damage to existing development at Calhoun would be eliminated. Nevertheless, a flood plain management program to assure the proper use of flood plain lands is needed to minimize potential future damages at Calhoun. Since the city takes its municipal and

industrial water from the Oostanaula River, which has a minimum flow of about 115 mgd at Resaca, the estimated water supply needs of Calhoun to the year 2020 are assured. The regulation provided by the Carters Dam and the proposed Dalton Reservoir will substantially increase the minimum flow at Resaca. The continued use of this source is predicated on the assumption that an acceptable quality of water in the stream will be maintained. The proposed Dalton Reservoir contains storage for water quality control to assist in maintaining an acceptable standard in the Conasauga River which will also be effective farther downstream in the Oostaula River and the upper Coosa River. In addition, the Carters project on the Coosawatte River will be operated to regulate low flows which will also contribute to improve water quality in the Oostanaula River and the Coosa River in the upstream reaches.

Cartersville

The existing and potential units of development for meeting specified needs of the Cartersville growth center in the Etowah River basin above Cartersville, Georgia, are depicted in the diagram shown below.

9 Upstream Watersheds (USDA)
88 Reservoirs in 8 Projects
F.C. - 57,715 AF

Allatoona Reservoir (CE)
F.C. - 302,580 AF *
P - 74,000 kw
W.S. - 23 mgd
W.Q. - 14,600 AF (Potential)

Estimate of Needs
Current Flood Damage - None
W.S. - 23 mgd
W.Q. - 10,000 AF

CARTERSVILLE

F.C. - 360,295 AF
W.Q. - 14,600 AF (Potential)

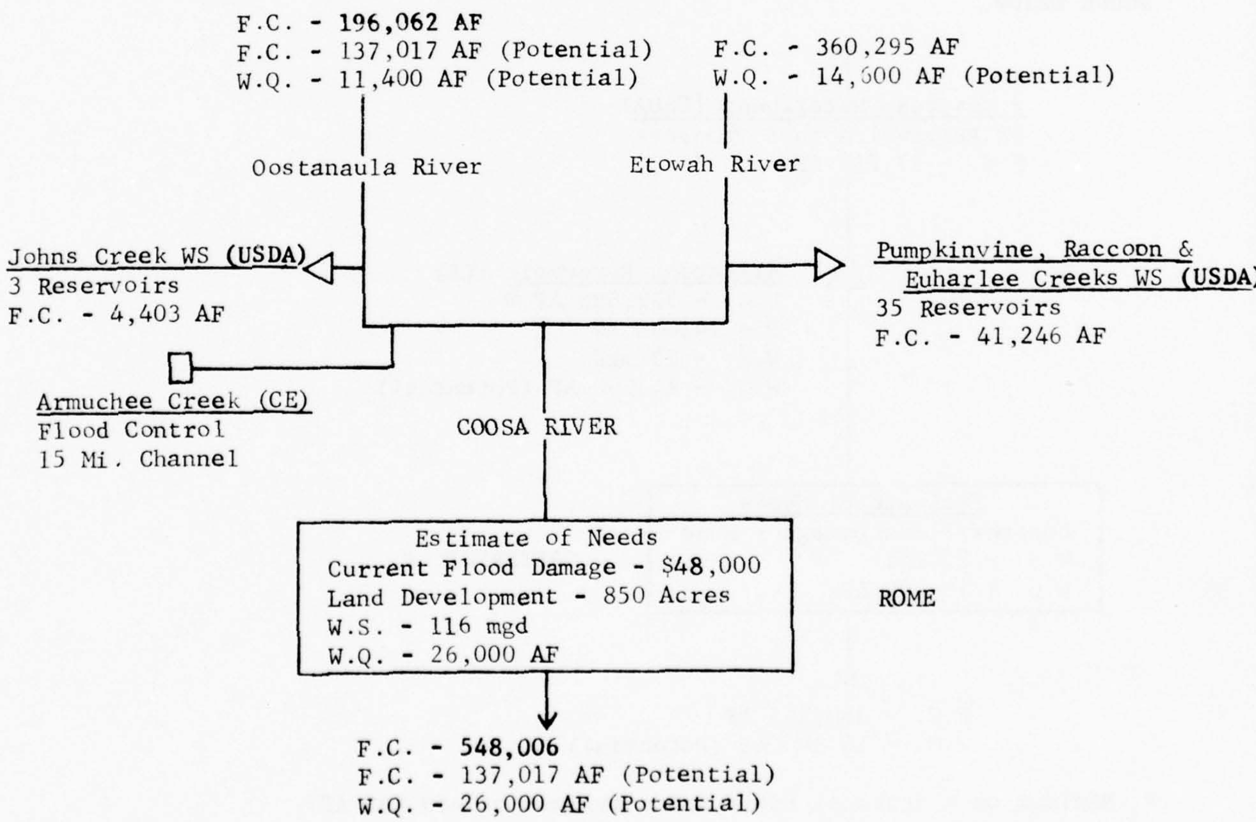
* Minimum on a seasonal basis and a maximum of 489,060 AF

ETOWAH RIVER ABOVE CARTERSVILLE, GEORGIA

With the exception of flood plain management, the water resource needs of the Cartersville growth center are presently and can for the future be met by the Allatoona Reservoir. Contracts for water supply storage will be negotiated as the need arises. Water quality control storage could be allocated in the reservoir and flow releases made for that purpose with special Congressional authorization. An alternative to reallocation if storage in the Allatoona Reservoir for water quality control would be development of the Gilmer Reservoir on the Etowah River upstream from the Allatoona Project with storage for that purpose. Information on the Gilmer site is given in Table 10-13.

<u>Rome</u>

The diagram below depicts specified water resource needs and relative location of the growth center and the existing or potential units of development from which needs could be met for the basin area comprised of the Coosa River and tributaries at and above Rome, Georgia.



COOSA RIVER AND TRIBUTARIES AT AND ABOVE ROME, GEORGIA

Flooding occurs on the Coosa, Oostanaula and Etowah Rivers in Rome, causing damages amounting to about $49,000 annually. Levee protection for the Fourth Ward area along the right bank of the Coosa and Oostanaula Rivers has been provided by the Corps of Engineers. Other urban areas at Rome are provided potential protection by flood storage in Allatoona and Carters Reservoirs, the latter under construction. Storage in the proposed Dalton Reservoir will afford some additional protection in this area. A higher degree of protection by structural measures does not appear to be warranted at this time. Reduction in potential future damages could be obtained through zoning and management of the areas subject to more frequent flooding.

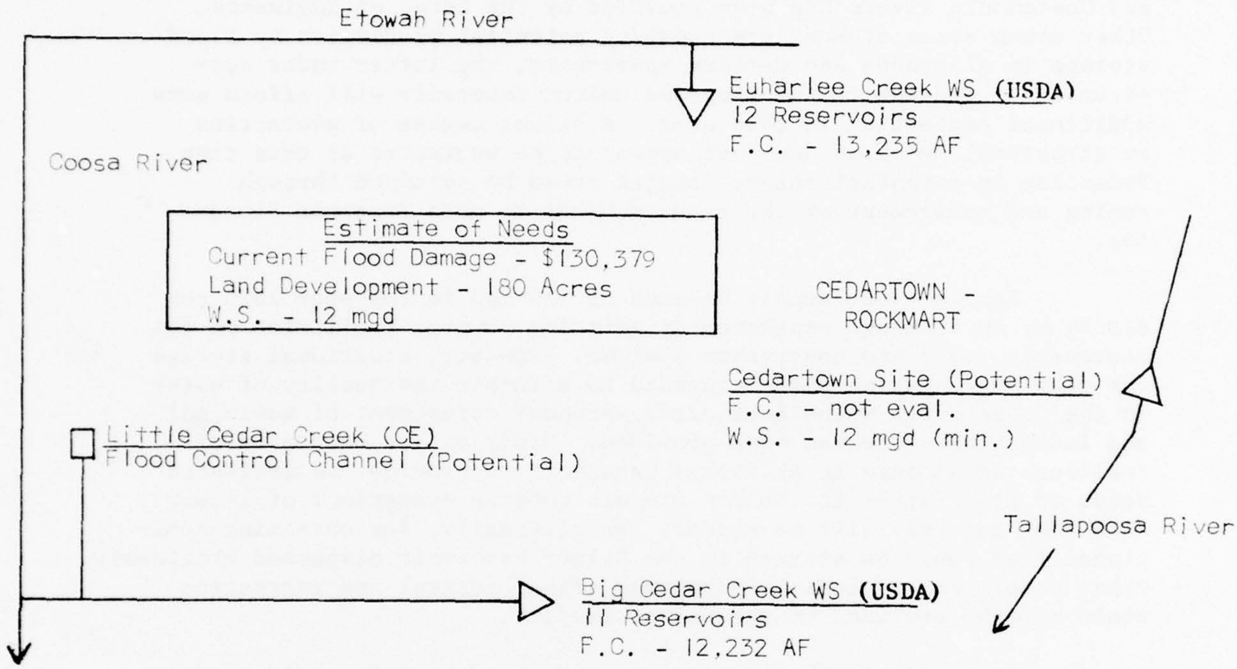
Rome's water supply demands of 116 mgd in the year 2020 can easily be met through expansion of existing pumping facilities on the Oostanaula River and conveyance systems. However, additional storage for flow augmentation will be needed to maintain the quality of water in the Coosa River below Rome after secondary treatment of municipal and industrial waste has been provided. Study of the economics of reallocating storage in Allatoona Reservoir to provide the estimated needs of Rome (after the Dalton project goes in operation) of 14,600 acre-feet per year will be needed. An alternative for obtaining additional flow would be storage in the Gilmer Reservoir discussed previously. Other water uses including hydropower, flood control and recreation could also be provided by the Gilmer Project.

Economic growth and expansion in the Rome area would be stimulated by the advent of barge-type navigation and terminal facilities. Information on the potential for growth related to navigation is provided in Chapter 9, Part III, of this report which contains a reevaluation report of the economic justification of the Coosa River navigation project from Montgomery to Rome. The report provides information on the expected savings to be received by shipper and receiver in the area from barge access to Rome. It also provides detailed data on industrial land needs and potential sites, and employment growth and wages generated by providing the barge access.

Cedartown-Rockmart

The growth center needs, relative location, and the existing or potential units of development for meeting specified water needs are shown in the following diagram.

Cedartown and Rockmart are located in the upland area of the divide between the Coosa and Tallapoosa drainage basins. Euharlee Creek flows through Rockmart and enters the Etowah River south of Cartersville while Big Cedar Creek flows through Cedartown and enters the Coosa River south of Rome. Plans for the authorized USDA upstream watershed projects on the two creeks include 23 flood retarding structures having 25,467 acre-feet of storage reserved for flood control. One structure in each watershed contains recreation storage but no municipal and industrial water supply or water quality control storage is provided. The total damage in these two upstream watershed areas is $130,379.



STREAMS IN THE VICINITY OF CEDARTOWN AND ROCKMART, GEORGIA

The flood control improvement included in the watershed plans provides for a reduction of $100,503 in these damages leaving a residual of $29,876. A small flood control channel improvement project on Little Cedar Creek, tributary of Big Cedar Creek, is being studied in the Mobile District under special continuing authority, for protection in the urban area of Cave Spring, Georgia (located about 10 miles northwest of Cedartown). A flood plain management program is needed in the urban reaches of Euharlee and Big Cedar Creeks in order to prevent unwise future use of the flood hazard areas.

The most practicable source of municipal and industrial water supply for the growth center appears to be storage on the Tallapoosa River, but a study of all alternatives is needed. The Cedartown site on the river has capability of providing 76 mgd (73,500 acre-feet per year) which would be substantially more than the 12 mgd water supply needs of Cedartown and Rockmart. Also, it appears that a single source and conveyance system serving the growth center would be more practicable than individual systems which is now the practice. In addition to providing storage for water supply it appears that treatment of waste to maintain acceptable standards in Euharlee and Big Cedar Creeks until 2020 may not be practicable and storage for

flow augmentation should be provided. This need could be satisfied by centralizing the water supply source from the Tallapoosa River, thus maintain the assimilative capacities of the tributary streams by avoiding withdrawal of their waters.

Summerville

Specified water and related resource needs and the relative location of the growth center and units of development for meeting the needs are shown in the diagram below.

Headwaters Chattooga River WS (USDA)*
8 Reservoirs (2 MP)
F.C. - 20,300 AF
W.S. - 4,200 AF

Estimate of Needs
Current Flood Damage - $64,500
Land Development - 20 Acres
W.Q. - 4,800 AF

SUMMERVILLE

F.C. - 20,300 AF (Potential)
W.Q. - 4,800 AF (Potential)

* Project Area Located in Water Sub-region J

CHATTOOGA RIVER IN VICINITY OF SUMMERVILLE, GEORGIA

Summerville is located on the Chattooga River which heads near LaFayette, Georgia, and empties into the Weiss Reservoir above Gadsden, Alabama. There are no existing Federal water resource developments in the basin and only the needs of LaFayette have been urgent enough to warrant Federal participation in studies for a water resource project. The USDA's potential upstream watershed project (Headwaters Chattooga River), which consists of 8 reservoirs with 20,300 acre-feet of flood detention storage and 4,200 acre-feet of municipal and industrial water supply storage, would provide the majority of the water use needs of the area. Annual flood damages in the upstream watershed area of $64,500 could be reduced to $14,600 by flood control improvements in the SCS's watershed plan. The water supply storage in two structures could meet the needs of LaFayette and the future needs of Summerville are less than the capacity of

of present sources. Therefore, only the expansion of conveyance systems would be necessary. Water quality problems in the Chattooga River will be alleviated by waste treatment facilities being installed by local interests. Studies indicate that, in addition to treatment of wastes, 4,800 acre-feet per year of storage for flow augmentation will be required to maintain a satisfactory quality of water in the Chattooga River until the year 2020. Available storage capacity in the reservoirs included in USDA upstream watershed project and other storage sites should be considered for this need.

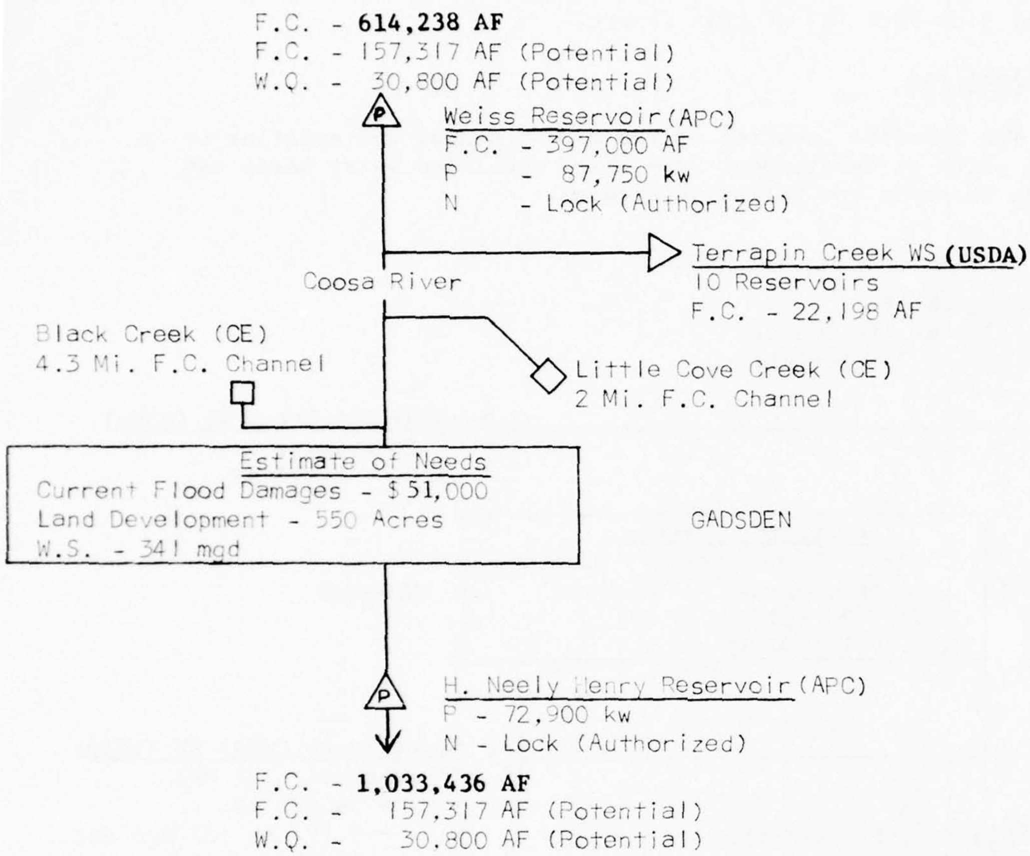
In general terms, the topography of the Chattooga River area is rather rugged but the urban centers of LaFayette, Trion and Summerville are located in plateau-type areas where available developable lands are sufficient to meet the future urban expansion needs. However, the use of areas subject to flooding is expected and a flood plain information and management program is needed to hold potential future flood damages to a minimum.

Gadsden

A diagram showing the relative location of the growth center and the existing or potential units of development from which specified water needs of the basin in the Gadsden area can be met is shown below.

Gadsden is located mainly on the right bank of the Coosa River but urban development has been spreading to the left bank in recent years. Encroachments on the floodway of the river are rather significant and are expected to continue because as urban growth proceeds, flood free developable lands become increasingly distant from the center of industrial and commercial activity. Average annual flood damage in this urban area amounts to $51,000. It is estimated that 550 acres of the floodway in the Gadsden area will be used for urban expansion during the 50-year study period. Guidance in the use of these lands based on flood plain information is needed to hold the future flood damages to a minimum. Some protection is afforded the area from frequent to moderate floods in the basin above Gadsden by the 397,000 acre-feet of storage for flood control in Weiss Reservoir. Partial protection is also provided in the western portion of Gadsden by the Corps channel improvement project constructed on Black Creek in 1950. Additional protection in Gadsden by structural measures does not appear warranted at this time.

Base flow in the Coosa River is sufficient to meet the 341 mgd water supply needs of Gadsden, and after secondary treatment of municipal and industrial waste loadings, flow augmentation storage does appear to be needed for maintenance of stream water quality. About the year 2000, additional treatment of waste loadings, about



COOSA RIVER IN VICINITY OF GADSDEN, ALABAMA

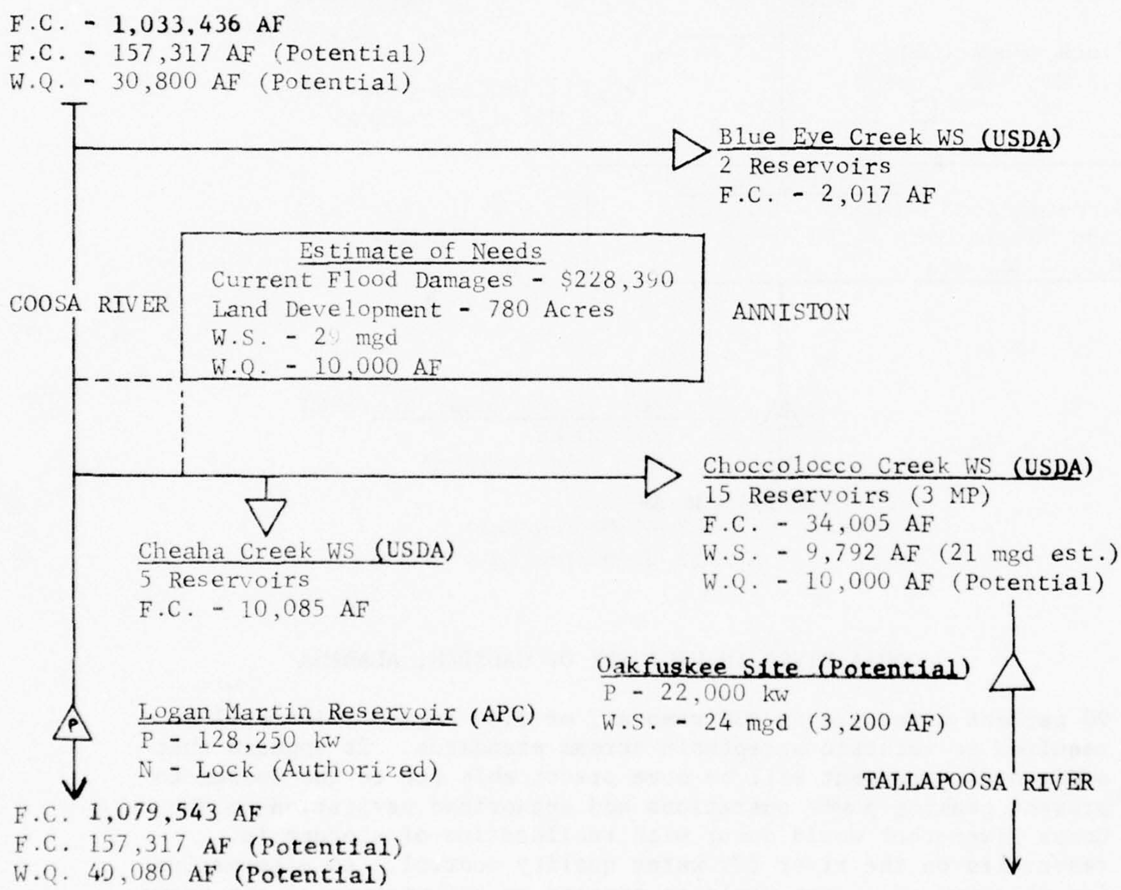
90 percent effective in BOD removal, or flow augmentation will be required to maintain acceptable stream standards. It appears that additional treatment will be more practicable due to the losses to present peaking power operations and authorized navigation on the Coosa River that would occur with reallocation of storage in reservoirs on the river for water quality control. An alternative for dilution of wastes would be storage on tributaries of the Coosa in this area.

The economy of Gadsden being orientated to heavy industry depends to a large extent on economical transportation for raw materials and finished products. Considerable savings to shippers and receivers in the Gadsden area will be afforded by the planned Coosa and Alabama waterway to Mobile, Alabama, which has a port for serving ocean-going vessels and barges using the Gulf Intracoastal Canal System. More

detailed information on the Coosa River navigation project is given in Chapter 9 of Part III of this report.

Anniston

The relative location of the growth center and existing or potential units of development from which specified water needs can be met are shown in the following diagram.



COOSA RIVER AND CHOCCOLOCCO CREEK IN THE VICINITY OF ANNISTON, ALABAMA

Anniston is located in the uplands between the Coosa River and Choccolocco Creek, but suburban expansion has spilled over into the Choccolocco basin with minor development in the flood plain at

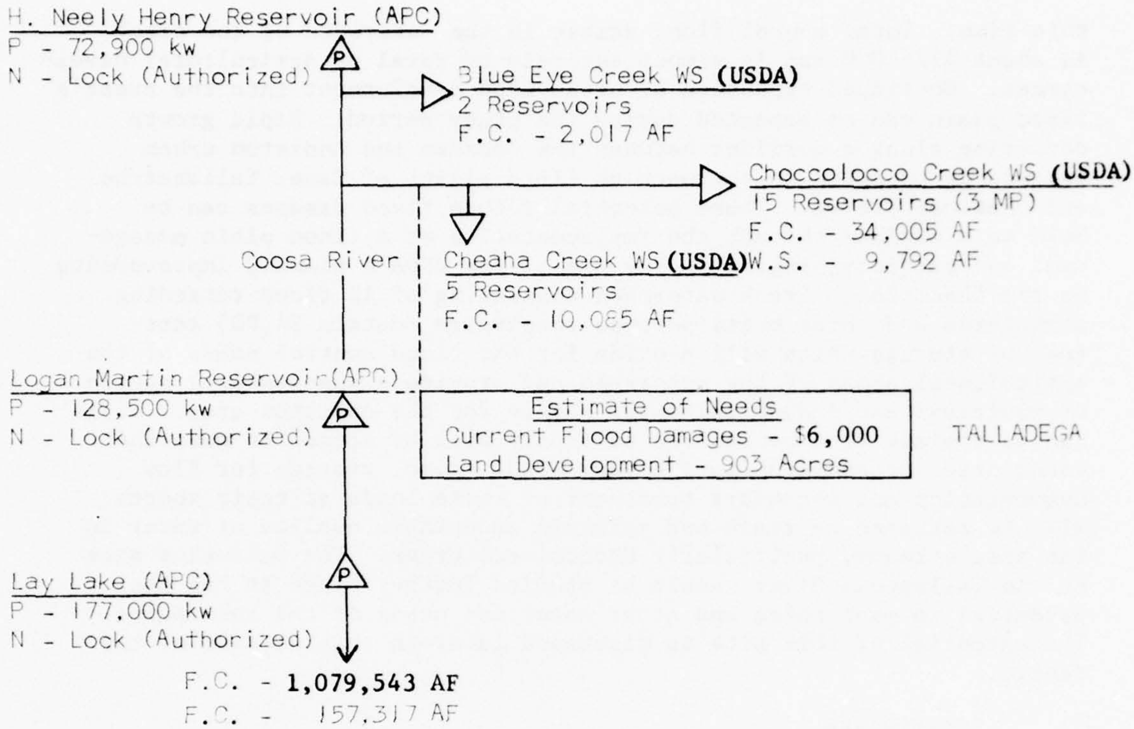
this time. Total annual flood damage in the watershed of the creek is about $228,000 and is almost entirely to rural or agricultural development. Continued expansion of urban-type development into the creek's flood plain can be expected during the study period. Rapid growth occurring along a corridor between the Gadsden and Anniston urban centers is expected to encroach on flood plains of Cane, Tallahatche, and Ohatchee Creeks. These potential future flood damages can be held to a minimum through the implementation of a flood plain management and services program in the area. The USDA's planned improvements in the Choccolocco Creek watershed consisting of 12 flood retarding structures and three multi-purpose reservoirs contain 34,005 acre-feet of storage which will provide for the flood control needs of the agricultural areas of the watershed and provide a supplemental source of municipal and industrial water supply for the Anniston area. Additional storage or a new source of supply will be needed to meet the water needs of Anniston to the year 2020. Also, storage for flow augmentation and secondary treatment of waste loads at their source will be required to reach and maintain acceptable quality of water in the area streams, particularly Choccolocco Creek. The Oakfuskee site on the Tallapoosa River should be studied further since it has the potential to meet these and other water use needs of the sub-region. The potential of this site is discussed later in this section of the report.

Talladega

A diagram showing the relative location and needs of the growth center and the existing or potential units of development from which specified water needs can be met is shown below.

In the Talladega growth center the Childersburg area is subject to flooding from the Coosa River. Sylacauga and Talladega are located in the headwaters area of the Tallasseehatchee and Talladega Creeks, respectively. It is estimated that 930 acres of land subject to frequent flooding will possibly be needed for urban development in the next 50 years. Flood plain information and management programs are needed in this area to minimize the future damages. Local protective measures for urban development in the Childersburg area have been studied and found to be not warranted at the current time. The only potentially feasible plan in this area at this time is an upstream watershed-type project on Tallaseehalchee Creek.

Water supply demands of the Talladega growth center of 99 mgd at the year 2020 can be met by available stream flow (Coosa River). Pumping, treatment and conveyance are of major concern. Maintenance of stream water quality can be achieved though treatment of waste loadings at their source.

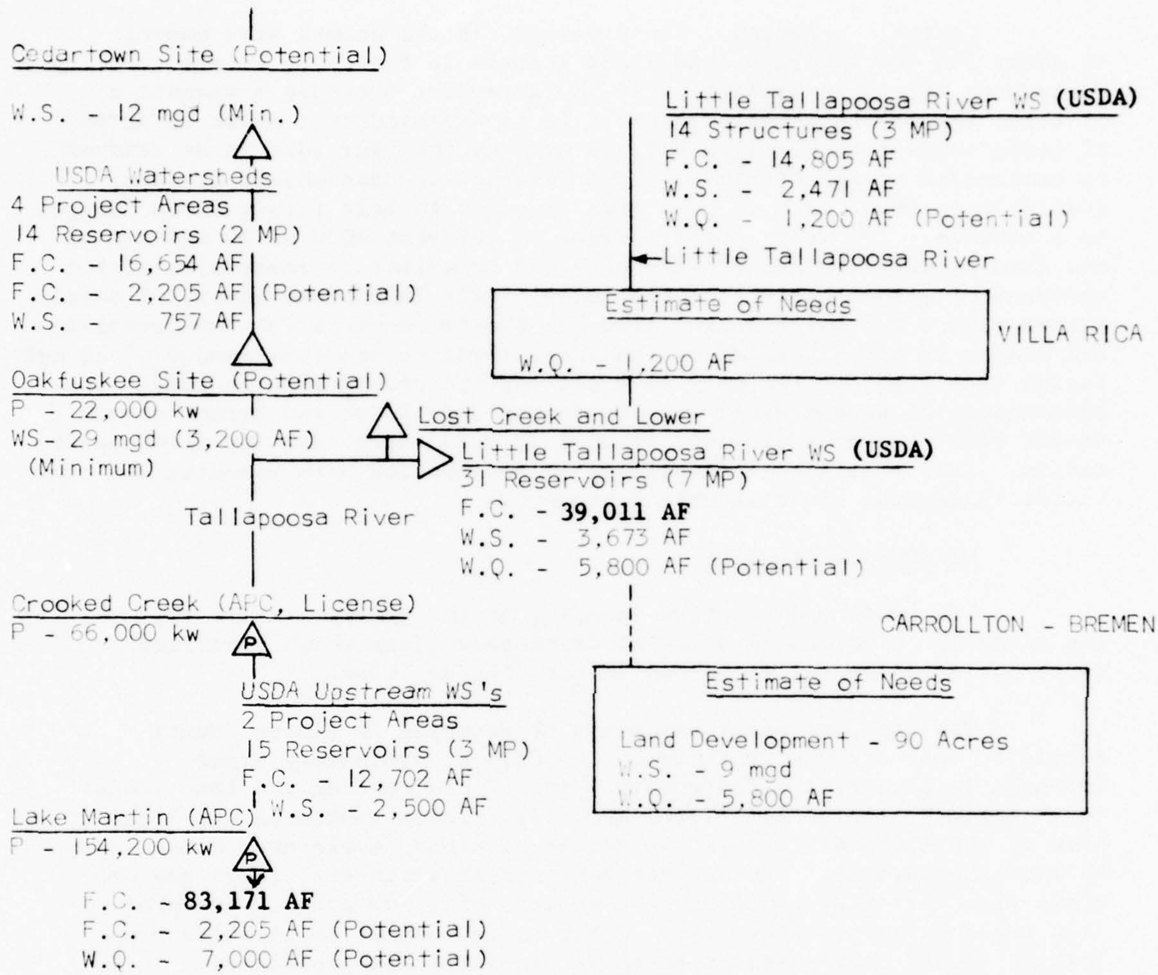


COOSA RIVER IN THE VICINITY OF TALLADEGA, ALABAMA

Villa Rica and Carrollton-Bremen

A diagram showing the relative location and specified water needs of the growth centers and existing or potential units of development from which these needs can be met is shown below.

Villa Rica. The USDA Little Tallapoosa River watershed project which contains 14,805 acre-feet of flood storage in 14 structures provides damage reduction benefits of about $83,420 primarily to agricultural development in the growth area. Residual damages amount to about $4,280 annually. Future urban growth in this area is not contingent on additional flood protection, since developable flood-free lands are available. The water supply demands to 2000 (approximately 4 mgd) can be met by storage in three structures included in the upstream watershed project on Little Tallapoosa River. An additional 2 mgd will be required after the year 2000 in order to meet the 2020 water supply demands of 6 mgd. Planning is being done on the local level to obtain raw water from Chattahoochee



TALLAPOOSA RIVER AND TRIBUTARIES ABOVE LAKE MARTIN

River to meet this need. Existing industrial waste loadings in the Villa Rica area result in a pollution problem in the Little Tallapoosa River. After treatment of wastes for 85 percent BOD removal, about 1,200 acre-feet of storage per year should be sufficient to maintain acceptable stream standards. This storage could be planned in conjunction with the upstream watershed project.

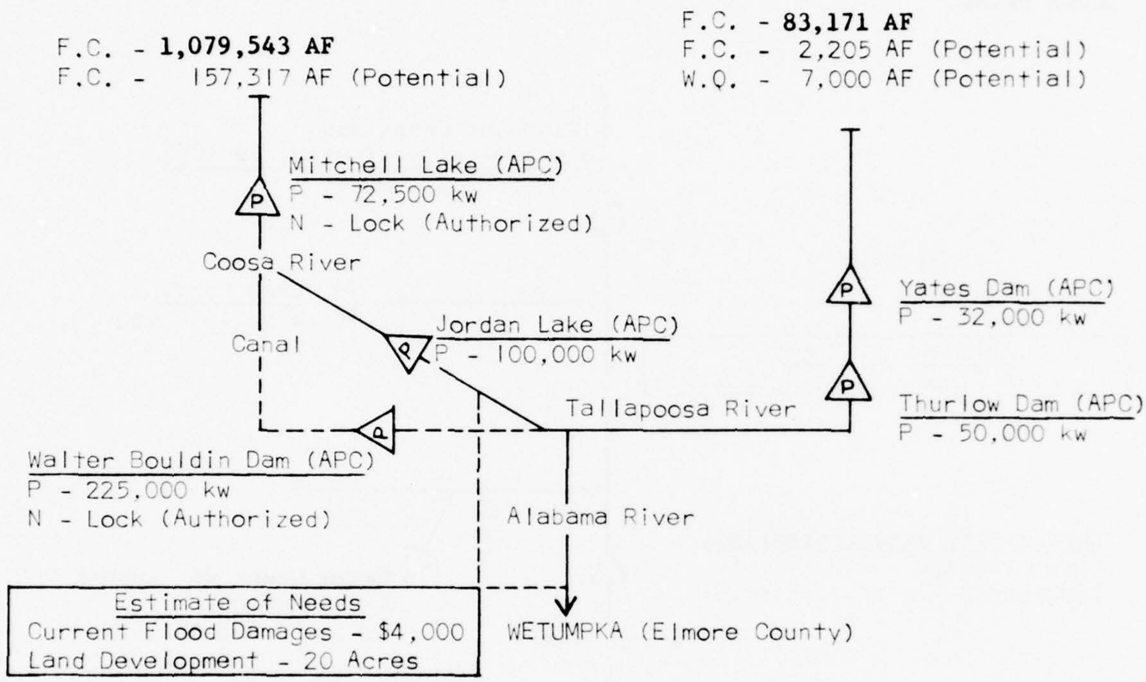
Carrollton-Bremen. Flood damages in the growth area amount to about $94,800 annually, and flood storage in the Lower Little Tallapoosa Watershed project of 36,183 acre-feet provides a reduction of about $82,610 in annual damages. It is expected that about 90 acres of lands subject to flooding will be used by the year 2020 in an attempt to centralize urban activity. Flood information data should be made available to developers in this area in order to hold future flood damages to a minimum. The water supply demand to the year 2000 of 20 mgd can be met from stream flow and storage of 3,673 acre-feet in reservoirs of the upstream watershed project on the Lower Little Tallapoosa River. A supply system with a raw water source from the Chattahoochee River for Carrollton and Bremen is being planned on the local level to meet the demand of 29 mgd in the year 2020, or the need of 9 mgd for the period 1980 to 2020. The maintenance of stream water quality in the Carrollton and Bremen growth center will require additional storage of 5,800 acre-feet for flow augmentation. This should be accomplished in conjunction with planning the Lower Little Tallapoosa River watershed project.

Wetumpka-Montgomery

The needs and relative location of the growth centers and the existing or potential units of development from which specified water needs can be met are shown in the diagram below.

The land and water use needs of Wetumpka in Elmore County should be considered with those of the City of Montgomery since Wetumpka is part of the Montgomery SMSA. Flood control and land needs for Montgomery can be met by the authorized levee system on the left bank of the Alabama River in the center of urban development known as North Montgomery. The project consists of earth fill levee and concrete floodwall that would protect an area of 1,500 acres. The project could be in place by 1980. Other areas subject to flooding are located in the urban area at Wetumpka and rural area in Elmore County along the Alabama and Coosa Rivers upstream from Montgomery. Presently the damages per mile along this rural area amount to only about $810 and protection by levees is not practicable. Annual flood damages in the Mill Creek watershed in Elmore County of about $24,600 have been virtually eliminated by an upstream watershed project of the USDA. In the urban area at Wetumpka flooding on the Coosa River causes damages of about $4,000 annually. Local protection is not warranted at Wetumpka at this time. A flood plain information study is needed to provide a basis for a flood plain management program to ensure the best use of these lands.

The water supply and water quality control needs of the Wetumpka-Montgomery area are not impediments to future urban and economic growth of the area. The potential for groundwater for water supplies is very good. This source is being used as well as



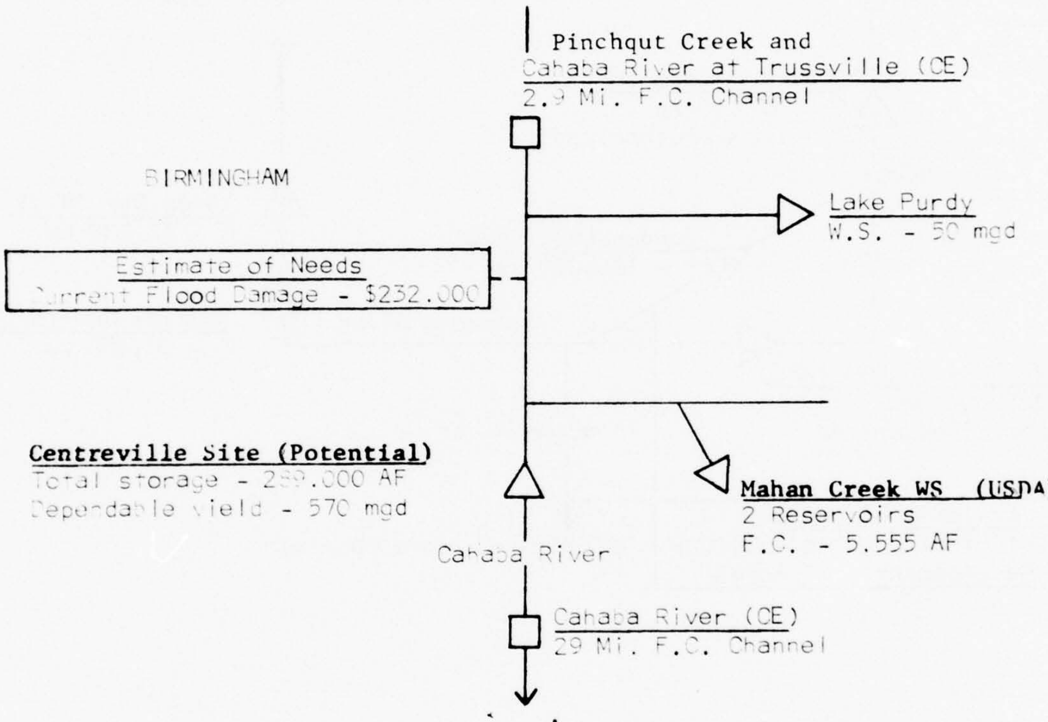
ALABAMA RIVER AND TRIBUTARIES ABOVE MONTGOMERY, ALABAMA

the stream flow of the Coosa and Tallapoosa Rivers. The dependable flow of either the Coosa or Alabama Rivers is far greater than the future demand that can be anticipated for the entire Montgomery-Wetumpka area. Private industrial use of stream flow can be expected. Secondary treatment of all wastes will be required in order to maintain the quality of water in the Alabama River at acceptable standards in the vicinity of Montgomery.

Birmingham

The Birmingham growth center is primarily located in the Black Warrior River Basin and this river has the potential for meeting most of the future water use needs of Birmingham as discussed later in the plan for the Black Warrior Basin. However, part of the existing

water supply demand is being provided from storage in the Cahaba River drainage basin. A diagram showing the relative location and need of the growth center and the existing or potential units of development in the Cahaba River from which specified water needs can be met is shown below.



CAHABA RIVER IN VICINITY OF BIRMINGHAM

Flood damages along Shades Creek, a tributary of the Cahaba River, in the urban area at Birmingham amount to about $232,000 annually. A survey report for flood control on this stream is underway in the Mobile District and is scheduled for completion in 1970. Pollution of Shades Creek from treated municipal waste and commercial establishments occurs during the dry months and urban expansion in this area could create serious pollution problems unless waste loadings are diverted to treatment plants on other streams or a higher degree of treatment is provided.

South of the Birmingham area in Bibb County, the urban center of Centreville is located on the Cahaba River. A potential reservoir

site on the Cahaba River about 10 miles above Centreville has storage capacity and a dependable yield sufficient to meet water use needs of the area in excess of the 50-year study period. Also, it has storage potential for flood control. Lack of growth in this area can be attributed to needs other than water resources such as improved highways. With provision of these needs, the economic growth could be stimulated so that water supply and water quality problems could develop in the next 50 years.

Other

The water use needs of identified growth centers in the Alabama-Coosa River Basin and possible solutions for providing the needs have been discussed in the preceding paragraphs. There are also other urban areas not classified as growth centers having water resource needs which should be considered in plan development. Ellijay, Georgia, is located primarily in the flood plains of the Ellijay and Cartecay Rivers at their junction in Gilmer County where the Coosawattee River is formed. The urban center is also located at the head of the Carters Reservoir on the latter stream. This area is mountainous and developable lands are scarce except in the flood plain areas of streams. For this reason the protection of potentially developable lands in the case of Ellijay could mean urban growth and economic prosperity instead of continued out-migration and slow costly expansion. A levee and appurtenant drainage facilities appears to be the most practicable solution to meeting these needs. Additional study of this area is needed to establish project dimensions and benefits. Also, Canton, Georgia in Cherokee County, upstream from the Allatoona Reservoir, experiences annual flooding from overflow on the Etowah River. Elimination or significant reduction of these damages could be accomplished by flood storage in the authorized Gilmer Reservoir on the Etowah River about 21 miles upstream from Canton, or by a system of levees and flood walls. Further study of this problem is also needed. In the Alabama portion of the basin, the town of Fort Payne in DeKalb County had problems primarily concerned with water supply and waste disposal, but supply has been provided by the construction of a water supply reservoir and water treatment on a watershed north of town. Further analysis of the needs of this area is required for solution of the waste disposal problem on the local level. Also, Boaz in Marshall County lies on the Tennessee Valley Divide and water supply and waste disposal problems are acute in terms of conveyance and treatment. These are problems which can be handled on the local level through grants and loans from the various agencies having authority to provide such assistance.

Identified growth centers such as Anniston in Alabama and Cedartown-Rockmart in Georgia may depend on the water resource potential of the Tallapoosa River for meeting their future water supply needs. These centers are located outside the Tallapoosa River drainage area where the non-existance of industrial or mine pollution in the river above the juncture of the Little Tallapoosa River provides

a basin that is very attractive for water supply impoundments. The Oakfuskee Reservoir with a drainage area of 640 square miles has potential for development of 22,000 kw of hydropower plus water supply storage. Storage is also available at the site for flood control as may be needed. This site could easily meet the water use needs of Anniston and adjacent communities. Another reservoir site with a drainage area of about 98 square miles could be developed about 10 miles south of Cedartown in the headwater area of the Tallapoosa River. A site at this location would have sufficient potential for meeting the water use needs of Cedartown and Rockmart. These sites should be given consideration in future studies of the Alabama-Coosa River Basin since, based on limited information available on planning at the local level and the desires of local interests, it appears that they will be required to meet water supply and other needs beyond the year 2000.

Summary

The most urgent water supply and water quality needs of the Alabama-Coosa River Basin can be met by the development of the Dalton Reservoir project and upstream watershed projects on the Headwaters Chattooga River, Choccolocco Creek, and the Little Tallapoosa River. The development of the Coosa River for barge navigation from Montgomery, Alabama, to Rome, Georgia, will provide a base for future economic growth and development in an area of the sub-region where this need is the greatest. The extension of the Alabama-Coosa Waterway to Rome will give the needed stimulus to growth for the 34 county tributary area to the Coosa River project. Provisions for barge transportation on this stream and attendant savings in transportation costs to shippers will attract new industry and stimulate the economy of the area. Some of the basin's more urgent flood control needs will be provided by the Dalton Reservoir and the authorized Montgomery levee system. Studies are underway in the Mobile District for channel improvements at Cave Spring and Birmingham, with a view to alleviation of flood conditions in those areas. However, some of the more acute rural flood control problems and smaller urban community water supply problems can be satisfied only by the development of upstream watershed projects. The USDA has an active program for this type of improvement in the Alabama-Coosa River Basin and six watershed-type studies were made especially for this report. Additional planning in the Cleveland, Tennessee growth area is need to establish the most economical water supply source available to the area. Consequently, the Coahulla Creek Upstream Watershed project is recommended for continued planning. A list of projects in the USDA's program is given below and the location of these projects is shown in Figure 10-10. The projects discussed in the preceding paragraphs would provide for the more urgent needs of the growth centers of the basin. Previous studies have determined that considerable potential for hydropower development exists in the northern half (Appalachian portion) of the basin. Potential reservoir projects in this and other areas of

TABLE 10-13
POTENTIAL RESERVOIR SITES IN ALABAMA-COOSA RIVER BASIN

Name of project	Location: Stream	Location: Miles above mouth	Drainage area (square miles)	Purpose	Minimum power or conservation pool elev. (ft. above msl)	Top power or storage pool elev. (ft. above msl)	Area at top pool (acres)	Usable storage (acre-ft.)	Total storage (acre-ft.)	Capacity (KW)
Emuckfaw (1)	Tallapoosa River	92.0	2,123	P-R-F	590	620	18,800	396,000	580,000	87,000
Crooked Creek (2)	Tallapoosa River	137.7	1,453	FC-P-R-F	745	780	7,900	197,000	315,000	50,000
Gilmer	Etowah River	100.0	395	FC-P-R-F	1,060	1,080	15,700	265,000	780,000(3)	68,000
Mills Creek	Mills Creek	5.1	65	P-R	665	690	4,520	89,500	145,000	2,000
Hatchet Creek	Hatchet Creek	7.1	359	P-R	440	470	11,100	255,000	515,000	44,000
Oakfuskee	Tallapoosa River	161.7	640	P-R	855	890	24,800	570,000	775,000	22,000
Waxahatchee Creek	Waxahatchee Creek	6.5	174	P-R	435	450	3,780	43,100	75,600	5,600
Canton	Etowah River	83.8	590	P-R	910	920	2,150	19,100	45,000	9,500
Kingston	Etowah River	24.4	1,687	P-R	660	670	4,550	35,500	82,000	38,000
Big Wills Creek	Big Wills Creek	25.0	191	P-R	640	660	4,870	76,500	125,500	3,200
Yellowleaf Creek	Yellowleaf Creek	10.1	106	P-R	465	475	4,800	39,700	77,300	3,400
Wallahatchee	Tallapoosa River	40.9	3,320	P	-	197	(4)	-	-	24,000
Centreville	Cahaba River	88.8	913	FC-R	300	333	9,500	195,000	289,000	-
Weogufka Creek	Weogufka Creek	15.8	111	P-R	545	570	2,550	50,000	98,000	7,200
Malone Ferry	Tallapoosa River	129.3	1,615	P-R	662.5	663	960	900	11,600	1,400
Cartecay	Cartecay River	1.7	136	P-R	1,385	1,460	3,650	160,000	215,000	10,500
Little River	Little River	30.4	119	P-R	1,205	1,240	765	12,300	12,700	1,700
Terrapin Creek	Terrapin Creek	12.2	220	P-R	620	640	1,850	23,000	31,300	2,900
Jacks River	Conasauga River	62.6	87	P-R	1,050	1,120	1,740	98,000	154,000	5,800
Big Canoe	Big Canoe Creek	5.0	238	S	510.5	535	14,400	189,000	203,000	-
Ellijay	Ellijay River	1.0	87	S	1,269	1,400	2,260	122,000	122,000	-

(1) May be developed by private power interests.
(2) Permit issued by FPC to Alabama Power Company for study.
(3) An additional volume of 119,000 acre-feet would be provided between elevations 1080 and 1087 for flood control using a plan of induced surcharge.
(4) Reservoir confined in existing river channel

Purposes
FC = Flood Control
P = Power
WS = Water Supply
R = General recreation
F = Fishing
S = Storage for downstream power plants

the basin are listed in Table 10-13 giving the total storage, usable storage for power generation or other purposes, and other information. Since the basin plan is provided to meet the more urgent needs as related to the Appalachian objectives, these potential projects are not included but are available for future planning.

The USDA's upstream watershed program for the Alabama-Coosa River Basin consists of the following:

Location Number	Name of Watershed	State
	(Expected to be in place by 1980)	
1	Amicalola Creek	Georgia
5	Jacks River	Georgia
8	Settingdown Creek	Georgia
9	Allatoona Creek	Georgia
10	Cartecay River	Georgia
11	Ellijay River	Georgia
12	Etowah River Reach	Georgia
17	Little River	Georgia
18	Little Tallapoosa River	Georgia
19	Long Swamp Creek	Georiga
20	Lower Little Tallapoosa River	Georgia
24	Mill Creek	Georgia
25	Mill-Canton Creek	Georgia
26	Mountaintown Creek	Georgia
27	Noonday Creek	Georgia
29	Pumpkinvine Creek	Georgia
30	Raccoon Creek	Georgia
32	Sharp Mountain Creek	Georgia
35	Stamp-Shoal Creek	Georgia
36	Talking Rock Creek	Georgia
40	Big Cedar Creek	Georgia
43	Euharlee Creek	Georgia
48	Little River	Georgia
53	Pinelog Tributary	Georgia
54	Sallacoa Creek Area	Georgia
65	John Creek	Georgia
6	Blue Eye Creek	Alabama
7	Cheaha Creek	Alabama
8	Choccolocco Creek	Alabama
9	Crooked Creek	Alabama
11	High Pine Creek	Alabama
13	Ketchepedrake Creek	Alabama
14	Lost Creek	Alabama
15	Mill Creek (Autauga County)	Alabama
16	Terrapin Creek	Alabama
20	Cahulgar Creek	Alabama

Location Number	Name of Watershed	State
	(AVAILABLE FOR PLANNING)	
29	Coahulla Creek (Water Sub-region J)	Tennessee
58	Headwaters Chattooga River (Water Sub-region J)	Georgia
59	Mill Creek Area	Georgia
28	Dyne Creek	Alabama
30	Jacks and Socapotay Creeks	Alabama
35	Mehan Creek	Alabama
38	Mill Creek (Cherokee County)	Alabama

Basin Plan

The recommended plan for development of the water resources of the Alabama-Coosa River Basin includes the following:

Projects in operation or expected to be in operation by 1980:

Corps of Engineers

Carters Reservoir, Georgia
Armuchee Creek, Georgia (F.C. Channel)
Allatoona Reservoir, Georgia
Rome, Georgia (levee)
Cave Spring, Georgia (F.C. Channel)
Collinsville, Georgia (levee)
Gadsden, Alabama (F.C. Channel)
Clanton, Alabama (F.C. Channel)
Montgomery, Alabama (levee)
Pinchgut Creek and Cahaba River at Trussville, Alabama (F.C. Channel)

USDA Upstream Watershed Projects

Jack's River, Georgia
Mill Creek, Georgia (Whitfield County)
Ellijay River, Georgia
Cartecay River, Georgia
Mountaintown Creek, Georgia
Talking Rock Creek, Georgia
Sallacoa Creek Area, Georgia
Pine Log Tributary, Georgia
John Creek, Georgia
Etowah River Reach, Georgia
Amicalola Creek, Georgia
Settingdown Creek, Georgia
Mill-Canton Creek, Georgia
Long-Swamp Creek, Georgia

USDA Upstream Watershed Projects (Cont'd)

Little River, Georgia
Noonday Creek, Georgia
Sharp Mountain Creek, Georgia
Allatoona Creek, Georgia
Stamp-Shoal Creek, Georgia
Pumpkinvine Creek, Georgia
Raccoon Creek, Georgia
Euharlee Creek, Georgia
Big Cedar Creek, Georgia
Terrapin Creek, Alabama
Blue Eye Creek, Alabama
Choccolocco Creek, Alabama
Cheaha Creek, Alabama
Little River, Georgia (Haralson County)
Cahulga Creek, Alabama
Ketchepedrake Creek, Alabama
Little Tallapoosa River, Georgia
Lower Little Tallapoosa River, Georgia
Lost Creek, Alabama
Crooked Creek, Alabama
High Pine Creek, Alabama
Mill Creek, Alabama (Elmore County)

Private Water Resource Developments

Weiss Dam, Alabama
H. Neely Henry Dam, Alabama
Logan Martin Dam, Alabama
Lay Dam, Alabama
Mitchell Dam, Alabama
Jordan Dam, Alabama
Walter Bouldin Dam, Alabama
Martin Dam, Alabama
Yates Dam, Alabama
Thurlow Dam, Alabama
Lake Purdy, Alabama

For construction:

Corps of Engineers

Montgomery Levee System, Alabama

Corps of Engineers (Cont'd)

Coosa River navigation channel from Montgomery, Alabama to Rome, Georgia - navigation locks at the following existing Alabama Power Company dams:

- Walter Bouldin Dam, Alabama
- Mitchell Dam, Alabama
- Lay Dam, Alabama
- Logan Martin Dam, Alabama
- H. Neely Henry Dam, Alabama
- Weiss Dam, Alabama

For authorization:

Corps of Engineers

Dalton Reservoir, Georgia

USDA Watershed Project

Headwaters Chattooga River, Georgia (Sub-region J)

For continuing planning:

Corps of Engineers

- Storage reallocation, Allatoona Reservoir, Georgia
- Water Supply Storage, Cedartown-Rockmart, Georgia
- Cave Spring, Georgia (F.C. Channel)
- Water Supply and Water Quality Control Storage, Summerville, Georgia
- Gadsden Levee, Alabama
- Childersburg Levee, Alabama
- Wetumpka Levee, Alabama
- Water Supply and Water Quality Control Storage, Anniston, Alabama
- Water Supply and Water Quality Control Storage, Villa Rica and Carrollton-Bremen, Georgia
- Birmingham, Alabama (F.C. Channel on Shades Creek)

USDA Watershed Projects

- Coahulla Creek, Georgia (Sub-region J)
- Mill Creek Area, Georgia (Murray County)
- Mill Creek, Alabama (Cherokee County)
- Jacks and Socapotay Creek, Alabama
- Dyne Creek, Alabama
- Mahan Creek, Alabama

For continuing planning:

Non-structural

Flood Plain Information Studies at:

Dalton, Georgia
Calhoun, Georgia
Ellijay, Georgia
Canton, Georgia
Allatoona Dam to Rome, Georgia
Rome, Georgia
Cedartown, Georgia
Rockmart, Georgia
Summerville, Georgia
Hadsden, Alabama
Anniston, Alabama
Talladega, Childersburg and Sylacauga, Alabama
Carrollton, Georgia
Wetumpka, Alabama
Centreville, Alabama

Future Studies

Initiate studies for flood control, water supply, water quality control and other purposes in the Alabama-Coosa River Basin with a view to determining the details of possible problem areas indicated in the preceding text and providing practicable solutions for authorization.

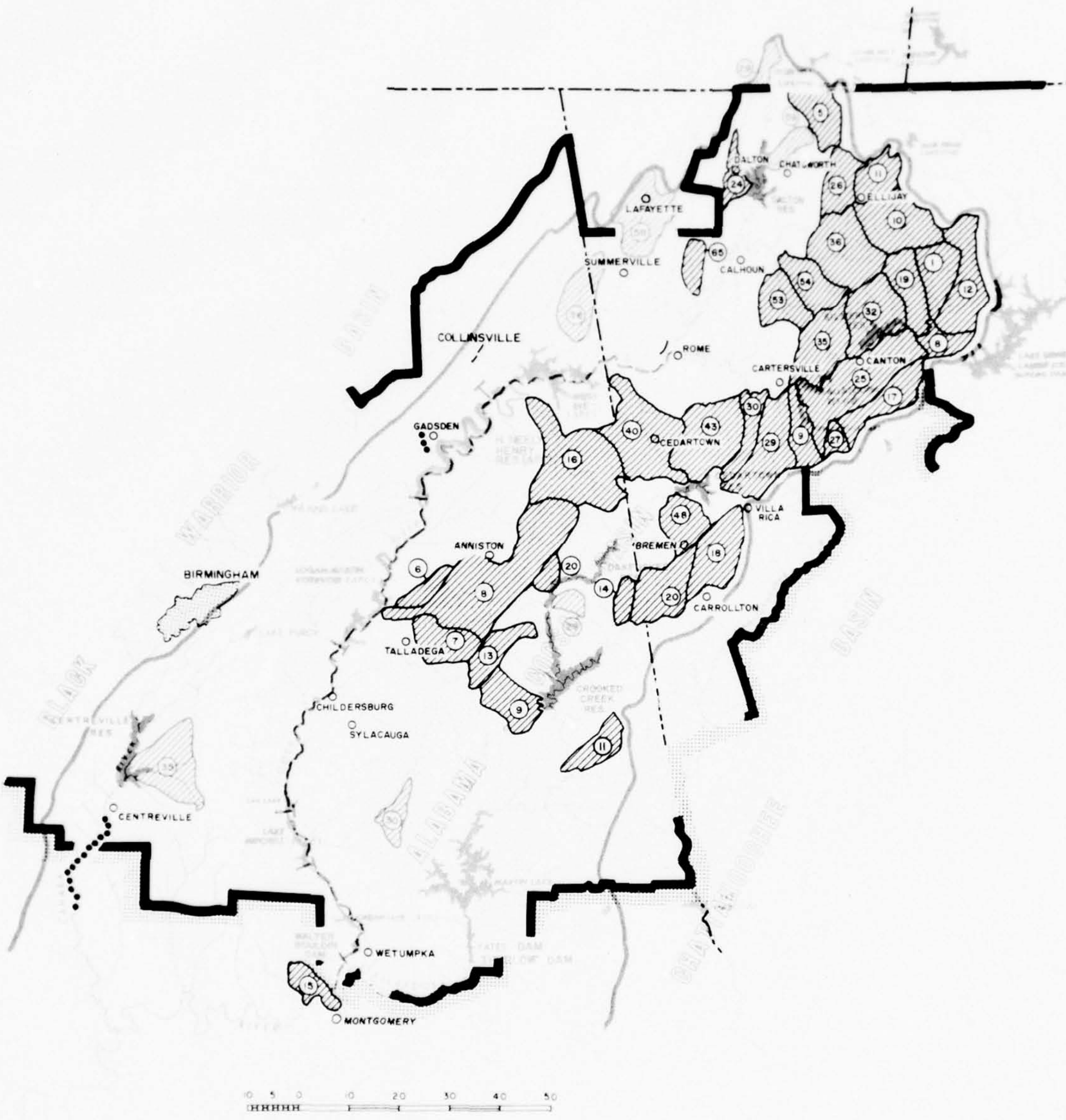
Table 10-14 shows the effectiveness of the selected plan in satisfying the navigation, flood control, water supply, water quality control problems of the growth centers. A map and schematic diagram of the various alternatives considered are shown on Figure 10-10.

TABLE 10-14

EFFECTIVENESS OF ALTERNATIVES CONSIDERED
IN ALABAMA-COOSA RIVER BASIN, SUB-REGION E

Item	Needs	Coosa River Navigation[b]	Dalton Res. (CE)	Headwaters Chattooga River (USDA)	Storage Reallocation Allatoona Reservoir	Unmet Needs	Indicated Future Studies
		OUTPUT OF ALTERNATIVE PROJECTS					
Water Supply	(MGD)						
Dalton	137		137			0	
Cedartown-Rockmart	12					12	Reservoir on Tallapoosa River
Anniston	29					29	Reservoir on Tallapoosa River
Villa Rica	2[a]						
Carrollton-Bremen	9[a]						
Water Quality Control	(1,000 AF)						
Dalton	11.4		11.4			0	
Cartersville	10.0				10.0	0	
Rome	26.0		11.4		14.6	0	
Summerville	4.8					4.8	Limited to Future Expansion of Upstream Watershed Project
Anniston	10.0					10.0	Limited to Future Expansion of Upstream Watershed Project
Villa Rica	1.2					1.2	Limited to Future Expansion of Upstream Watershed Project
Carrollton-Bremen	5.8					5.8	Limited to Future Expansion of Upstream Watershed Project
Flood Control (current damage)	($1,000)						
Calhoun	1.0		1.0			0	
Rome	48.0		19.0			29.0	Local Flood Protection & Flood Plain Management Program
Summerville	64.5			49.9		14.6	Flood Plain Management
Cedartown-Rockmart (Cave Spring)	32.0[c]					32.0	
Gadsden	51.0					51.0	Local Protection Levees
Talladega (Childersburg)	6.0					6.0	Local Protection (Levees)
Wetumpka	4.0					4.0	Local Protection (Levees)
Birmingham	232.0[d]					232.0	
Flood Control (Future urban land use in flood plain-acres)							
Dalton-Calhoun	370					370	Flood Plain Management
Rome	850					850	Flood Plain Management
Cartersville	20					20	Mapping below Allatoona Res.
Cedartown-Rockmart	180					180	Flood Plain Management
Summerville	20					20	Flood Plain Management
Gadsden	550					550	Flood Plain Management
Anniston	780					780	Flood Plain Management
Talladega	930					930	Flood Plain Management
Wetumpka	20					20	Mapping below Jordan Res.
Birmingham	1,870					1,870	Flood Plain Information Program Established
Navigation	(1,000 tons)						
Montgomery to Rome	11,564	11,564					
Recreation	(1,000's)						
User days	71,760		2,372	34		69,354	Major Reservoirs and Upstream Watershed Projects
Performance Index No. 1		1.04	1.4	1.3	e/		
Performance Index No. 2		6.3	2.2	1.6[f]	e/		

a/ Water to be obtained from Chattahoochee River, local plan being developed.
b/ Project consist of six navigation locks at existing power dams and dredging in upper reaches of some reservoirs.
c/ Channel improvement project at Cave Spring under study by authority of Sec. 205 of the Flood Control Act of 1948, as amended.
d/ Survey scope study for possible flood control improvements in progress under authority of resolution of 26 August 1966 by Committee on Public Works of the United States Senate.
e/ Performance index not available.
f/ As reported in Appendix A.
g/ Performance index not developed.



UPSTREAM WATERSHED
INDENTIFICATION

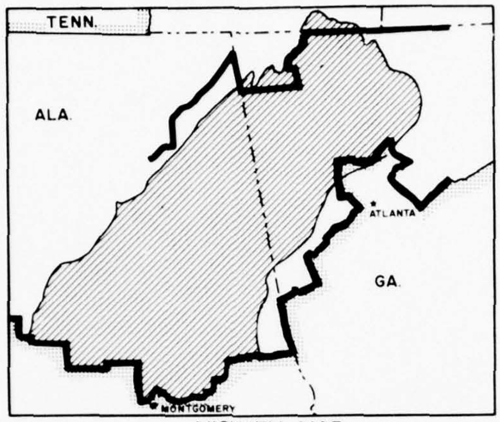
EXPECTED TO EXIST BY 1980

6 Blue Eye Creek
7 Cheaha Creek
8 Choccolocco Creek
9 Crooked Creek
11 High Pine Creek
13 Ketchepedrake Creek
14 Lost Creek
15 Mill Creek
16 Terrapin Creek
20 Cahulga Creek

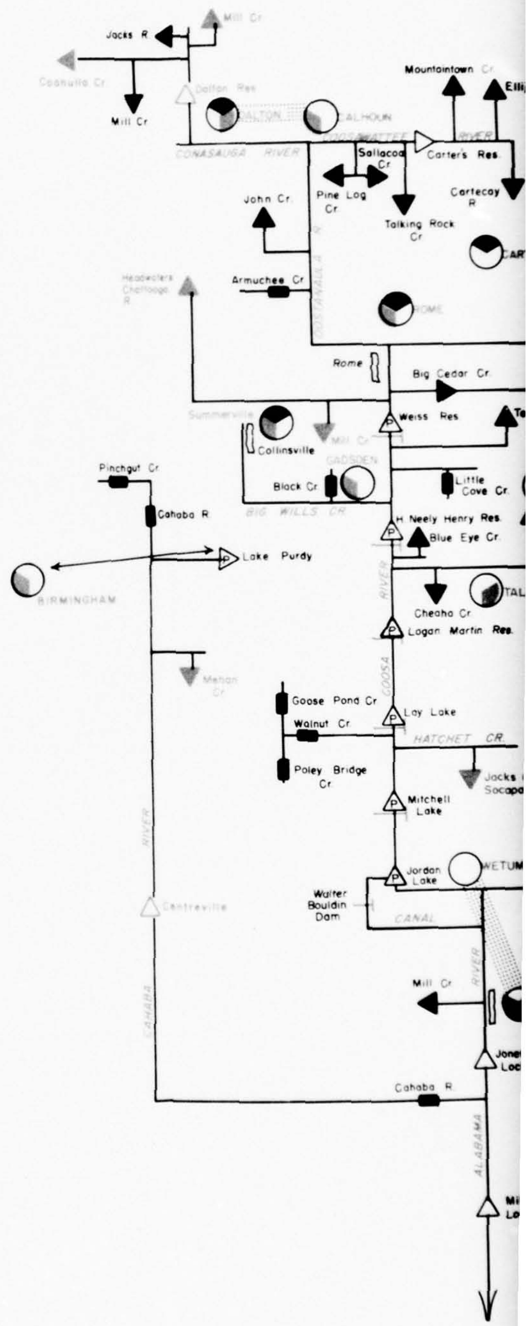
1 Amicalola Creek
5 Jacks River
8 Settingdown Creek
9 Allatoona Creek
10 Cartecay River
11 Ellijay River
12 Etowah River Reach
17 Little River
18 Little Tallapoosa River
19 Long Swamp Creek
20 Lower Little Tallapoosa River
24 Mill Creek
25 Mill-Canton Creek
26 Mountaintown Creek
27 Noonday Creek
29 Pumpkinvine Creek
30 Raccoon Creek
32 Sharp Mountain Creek
35 Stamp-Shoal Creek
36 Talking Rock Creek
40 Big Cedar Creek
43 Euharlee Creek
48 Little River
53 Pine Log Tributary
54 Sallacoa Creek Area
65 John's Creek

ALTERNATIVES AVAILABLE FOR

28 Dyne Creek
29 Coahulla Creek (TENNESSEE)
30 Jacks and Sacapotay Creek
35 Mohan Creek
38 Mill Creek
58 Headwaters Chattooga River
59 Mill Creek Area



VICINITY MAP



UPSTREAM WATERSHED PROJECT INDENTIFICATION

XPECTED TO EXIST BY 1980

6 Blue Eye Creek
7 Cheaha Creek
8 Choccolocco Creek
9 Crooked Creek
11 High Pine Creek
13 Ketchepedrake Creek
14 Lost Creek
15 Mill Creek
16 Terrapin Creek
20 Cahulga Creek

1 Amicalola Creek
5 Jack's River
8 Settingdown Creek
9 Allatoona Creek
10 Cartecay River
11 Ellijay River
12 Etowah River Reach
17 Little River
18 Little Tallapoosa River
19 Long Swamp Creek
20 Lower Little Tallapoosa River
24 Mill Creek
25 Mill-Canton Creek
26 Mountaintown Creek
27 Noonday Creek
29 Pumpkinvine Creek
30 Raccoon Creek
32 Sharp Mountain Creek
35 Stamp-Shoal Creek
36 Talking Rock Creek
40 Big Cedar Creek
43 Euharlee Creek
48 Little River
53 Pine Log Tributary
54 Sallacoa Creek Area
65 John's Creek

LTERNATIVES AVAILABLE FOR PLANNING

28 Dyne Creek
29 Coahulla Creek (TENNESSEE)
30 Jacks and Socapotty Creek
35 Mahan Creek
38 Mill Creek
56 Headwaters Chattooga River
59 Mill Creek Area

LEGEND

APPALACHIAN REGION BOUNDARY
RIVER BASIN BOUNDARY
WATER SUB-REGION E BOUNDARY

EXPECTED TO EXIST BY 1980:

MAJOR RESERVOIR
UPSTREAM WATERSHED PROJECT
FLOOD CONTROL CHANNEL
LPP PROJECT

PLANNING ALTERNATIVES

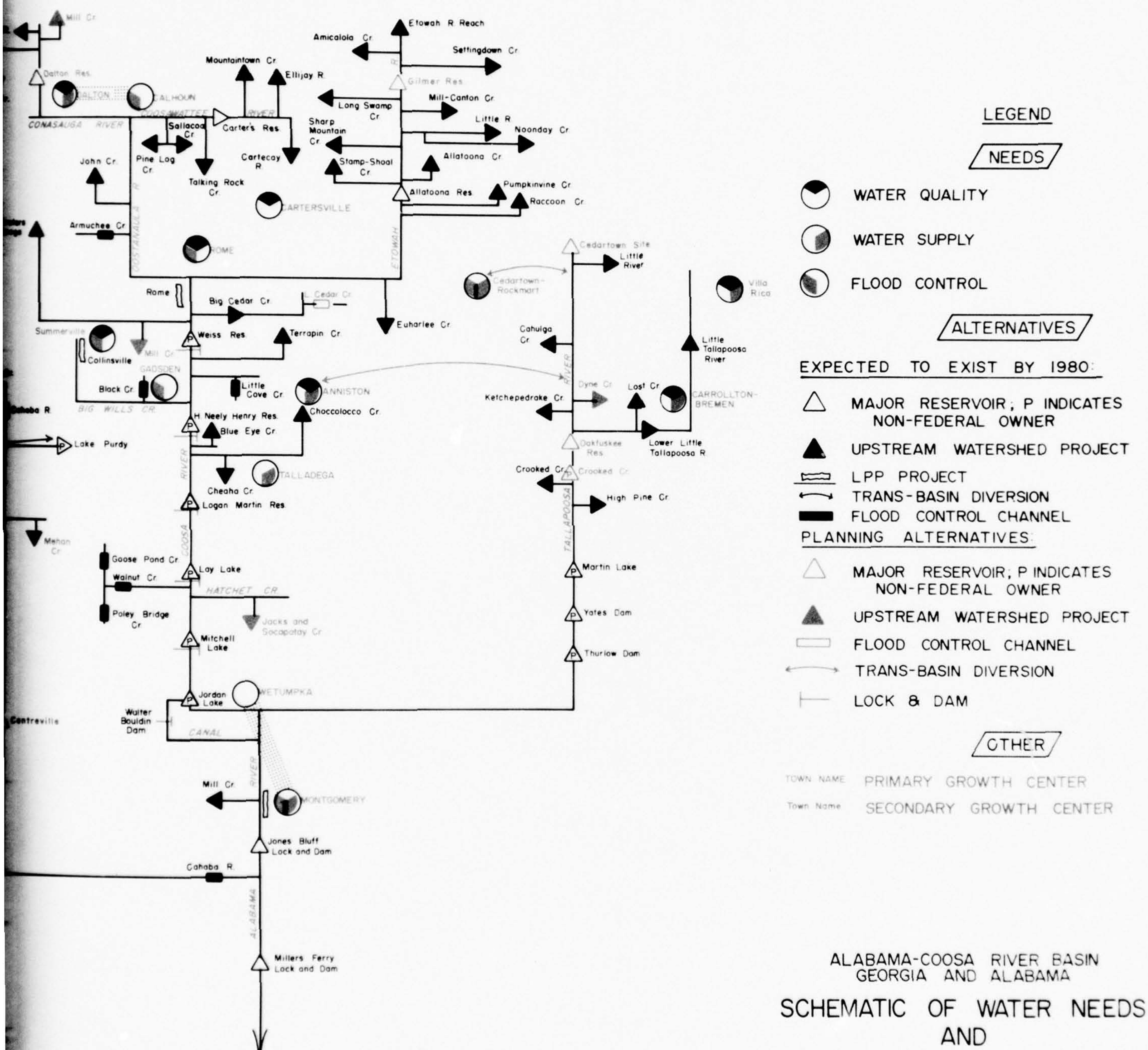
MAJOR RESERVOIR
UPSTREAM WATERSHED PROJECT
LOCK AT EXISTING DAM
WATERWAY

NOT ALL SHOWN

ALABAMA-COOSA RIVER BASIN
GEORGIA AND ALABAMA

LOCATION MAP

1 2



ALABAMA-COOSA RIVER BASIN
GEORGIA AND ALABAMA

SCHEMATIC OF WATER NEEDS AND ALTERNATIVE SOLUTIONS

FIGURE 10-10

3

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Black Warrior Basin

As discussed previously, the Birmingham SMSA is located partially in the Black Warrior River Basin and partially in the Alabama-Coosa River Basin (Cahaba River portion). The previous discussion of the Alabama-Coosa River area treated only the flood control and water quality problems of the Birmingham growth center as related to the Alabama-Coosa Basin. The Black Warrior River exerts the greatest influence on this growth center and also offers the best opportunities for possible solutions of the major growth center's water use problems. This discussion, therefore, covers the water and related land resource problems of the growth center as a whole, excluding flood control and water quality control needs of the Alabama-Coosa (Cahaba) River area.

In addition to Birmingham, the Black Warrior Basin located entirely in Alabama includes the Tuscaloosa growth center. The major portion of the Birmingham growth center is located in tributary areas of the Black Warrior River in the east-central portion of the basin, while the Tuscaloosa growth center is in the main river valley near the lower limits of the basin. There are no secondary growth centers within the basin.

Birmingham

The relative location of the growth center and the existing and potential units of development from which specified water related needs of the basin above the John Hollis Bankhead Lock and Dam can be met, are identified in the following diagram.

Birmingham proper, by virture of its location on the divide between the Black Warrior and Alabama-Coosa Rivers, is not subject to river-type flooding. Several tributary streams which drain the area, however, are subject to overflows which damage urban property. Flooding along these tributaries which contribute some to the Black Warrior via the Locust Fork, such as Five Mile, Valley and Village Creeks, damage urban development and create a nusiance. Along the Locust Fork, primarily at Port Birmingham, floods cause urban-type damages of about $34,000 annually. The nuisance value and frequency of damaging floods on these streams, excluding the Locust Fork, have been reduced to some extent by channel and other improvements by the local governments. A flood plain information study program including 15 flood plain information studies in the Birmingham area has been initiated under the sponsorship of the Birmingham-Jefferson County Regional Planning Commission, and an information-type report has been completed for Five Mile Creek. Implementation of a flood plain management program based on this information and maintenance of the stream channels should minimize the problems in the congested urban areas of the smaller tributary streams. Potential flood storage of 430,000 acre-feet at the Smiths Ford Reservoir site would virtually eliminate annual urban flood damages of $34,000 on the Locust Fork and provide some flood damage reduction in the urban area at Tuscaloosa-Northport about 55 miles downstream. This storage capacity is

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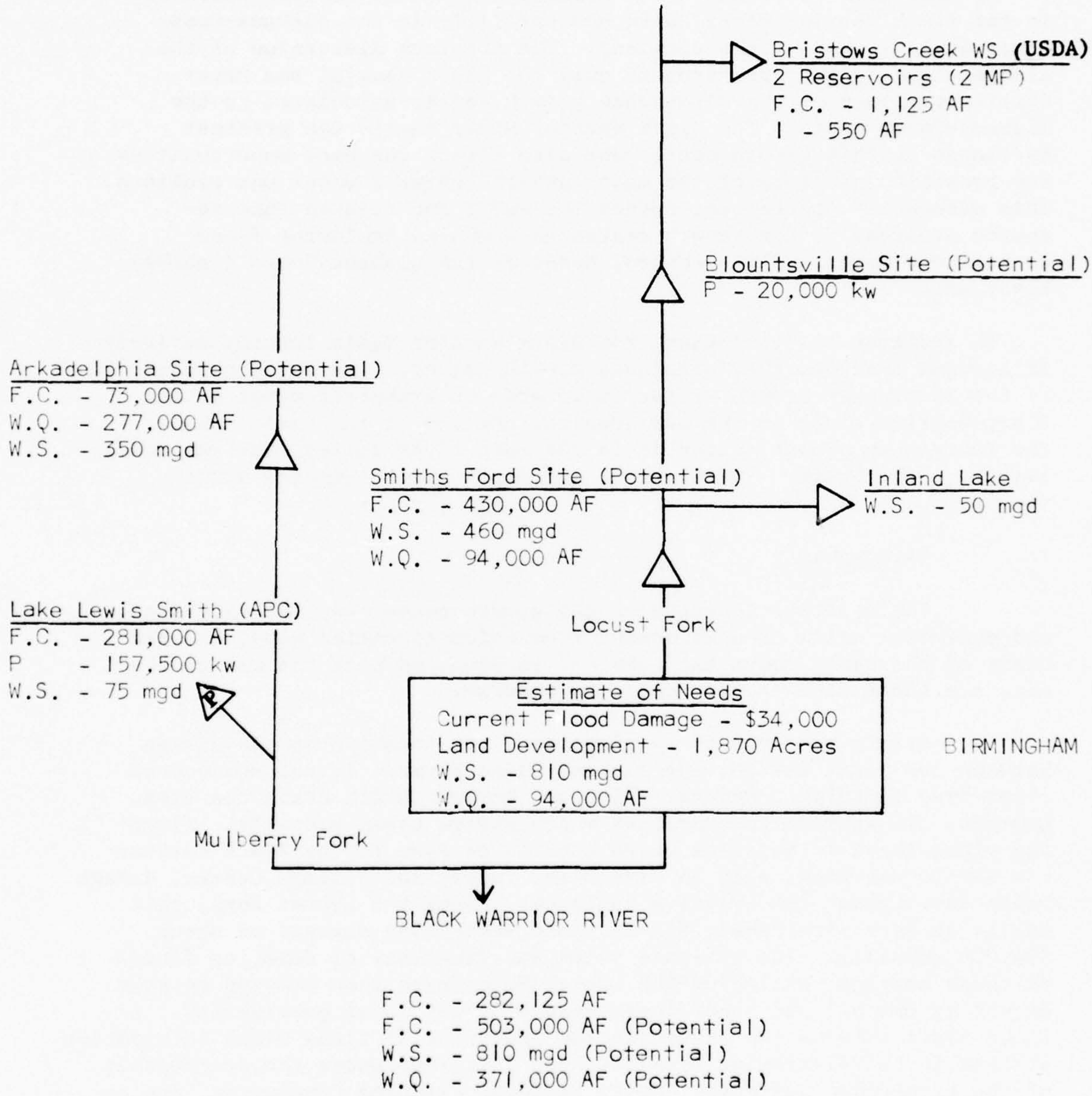


BLACK WARRIOR RIVER ABOVE BANKHEAD LOCK AND DAM

equivalent to runoff from the standard project flood storm over the 575 square miles drainage area above the site. The storage would reduce flooding sufficiently to permit use of flood plain lands and meet some of the needs for 1,870 acres for land development. Potential flood storage of 73,000 acre-feet at the Arkadelphia site with a drainage area of 550 square miles would reduce damages at Cordova on the Mulberry Fork and other downstream areas.

Birmingham presently obtains its water supply from the Lewis M. Smith Reservoir, Inland Lake and Lake Purdy (the latter on the Little Cahaba River, tributary to the Alabama River). The supply available from these and other private systems is about 880 mgd; the demand in 2020 is 1,690 mgd, leaving unmet needs of 810 mgd. Some of these can be provided by additional purchase from the privately-owned Lewis M. Smith project and expanding the conveyance system from that source. It is apparent, however, that additional reservoir development will be required to meet the major portion of the unmet needs. One alternative which appears practicable would be the inclusion of water supply storage in planning the potential Smiths Ford and Arkadelphia projects for flood control and other purposes. Based on an estimated dependable yield of 8.81 mgd per square miles of drainage area for the Locust Fork, about 440,000 acre-feet of storage per year could be developed at the Smith Ford site although the practicable storage limit based on site topography is about 925,000 acre-feet. It appears that the best use of the storage at the Smith Ford site would be for about 460 mgd (386,000 acre-feet) of water supply, in addition to the previously discussed flood storage of 430,000 acre-feet, and needs of 94,000 acre-feet per year for water quality control, and a sedimentation reserve of about 15,000 acre-feet. Use of the site to its maximum yield capacity as discussed above would preclude hydropower development at the site. In addition to the Smiths Ford site, it appears practicable to plan for part of future water supply needs of the Birmingham area at the Arkadelphia site on the Mulberry Fork. The practicable storage limit based on reservoir costs is for a total volume of about 656,000 acre-feet which could produce a maximum dependable yield (after flood control and sedimentaiton storage of 82,000 acre-feet are reserved) of about 480 mgd. Of the 574,000 acre-feet of storage reserved for water supply and water quality control, about 277,000 acre-feet is needed for maintenance of stream water quality in the downstream area at Tuscaloosa and the remaining 297,000 acre-feet could be allocated to water supply for Birmingham. However, since the area of water quality need is about 55 miles downstream from Birmingham, the total yield potential of the Arkadelphia site could be run through the Birmingham water system and returned to the Locust Fork (about 80 percent of 480 mgd or with only 20 percent loss) for dilution and recovery of augmentation potential at Tuscaloosa. Therefore, functioning together for water supply and water quality control purposes, the Smiths Ford and Arkadelphia reservoir sites could produce a dependable yield for water supply of 940 mgd (460 mgd Smiths

Ford and 480 mgd Arkadelphia). Current studies, under other authority in the Mobile District, indicate that storage to meet the estimated demand of 450 mgd by 2000 could be included at the Smiths Ford project. The remaining 360 mgd required to 2020 could be obtained by development of the Arkadelphia project.

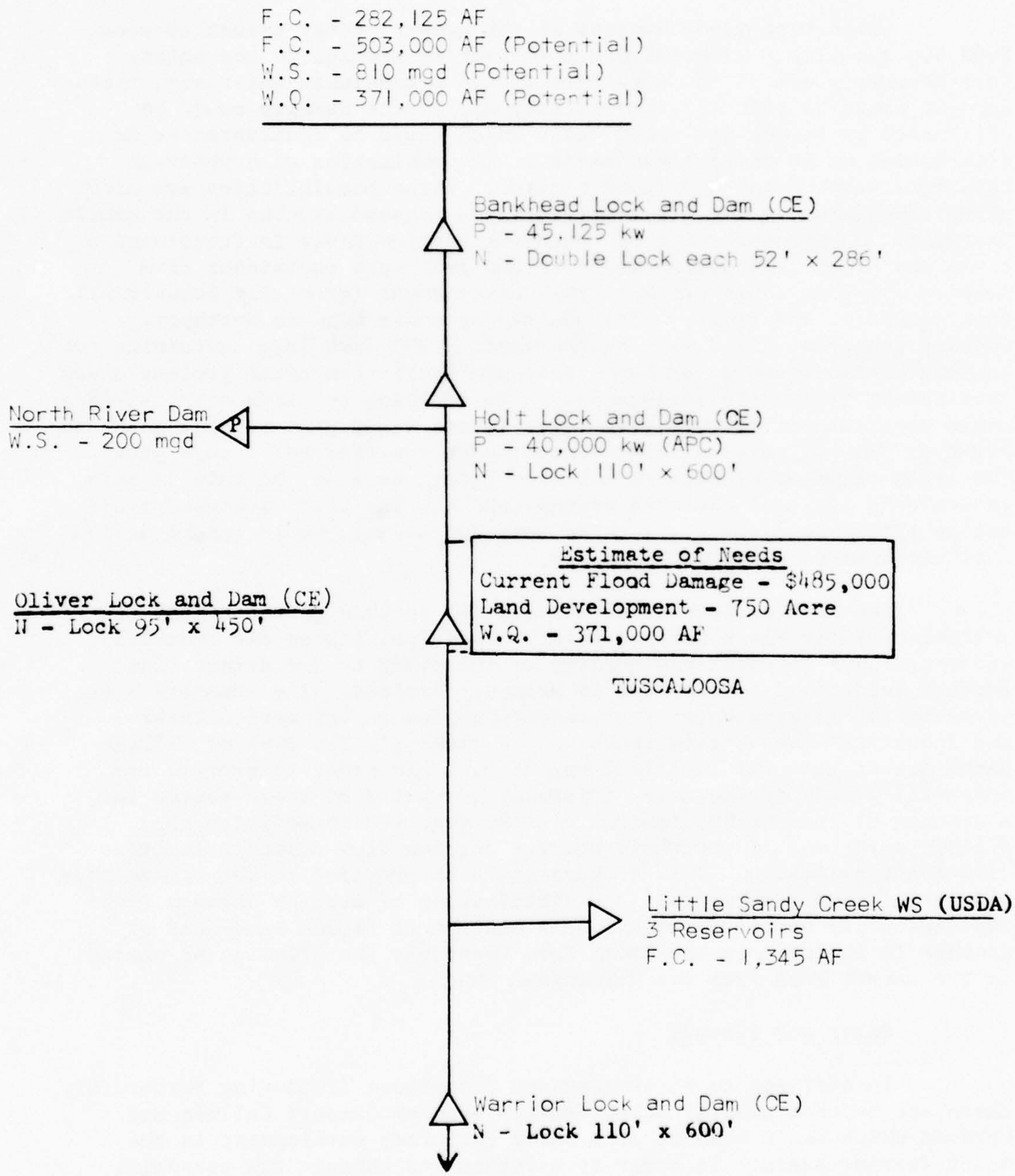
The Birmingham SMSA is the major source of pollution in the upper portion of the Black Warrior River Basin. Several small streams such as Five Mile, Valley, and Village Creeks have been severely degraded by the discharge of inadequately treated sanitary wastes and untreated industrial effluents into the streams. These streams contribute their waste-loaded waters to the Locust Fork in the upper reaches of Bankhead Lake. Reservoir storage on these small streams for dilution of the wastes in the creek waters is not possible because of the low base flow of the streams. It is incumbent upon local interests to provide treatment of these wastes to the highest possible degree. With 85 percent treatment of the wastes at their sources, a minimum of 94,000 acre-feet of storage on the Locust Fork at the Smiths Ford site would be required to restore and maintain the quality of that stream at the proposed standard of 4 mgl D.O.

Some stream pollution by acid mine drainage occurs in the headwater streams of the Black Warrior River Basin but it is not a serious problem such as occurs in other northern parts of the Appalachian Region. Acid waters from mining areas drain by small streams and creeks and are neutralized rapidly upon entering the main river and impoundments due chiefly to the large dilution factor. Solids from mine waste are rapidly deposited in sluggish backwater of impoundments and present only a localized problem. At present acid mine drainage does affect development of recreation and public use areas by restricting use for potable water supply and water contact sports, but this occurs only in a few isolated areas. Active mines are presently under orders from state authorities to treat wastes, which should lessen the existing problem. Future mining in this area should not result in additional mine waste problems due to treatment requirements and, under present conditions, Federal participation in the corrective actions is not anticipated.

Tuscaloosa

The Black Warrior River area from the Bankhead Lock and Dam downstream to the Warrior Lock and Dam near the southern limits of Appalachia is shown schematically on the illustration below. Specified water needs of this area and existing and potential developments to meet the needs are also shown in the diagram.

The major needs of the Tuscaloosa growth center, which includes the incorporated town of Northport, are for flood control and water quality control. This growth center, unlike most others, has no foreseeable water supply problem. The City of Tuscaloosa is constructing a reservoir on the North River, a tributary of the Black



BLACK WARRIOR RIVER BELOW BANKHEAD LOCK AND DAM

Warrior, with a dependable yield of 200 mgd which will meet the demand estimated for the year 2020.

Urban-type flood damages in the growth center amount to about $485,000 annually. With 430,000 acre-feet of storage in the Smiths Ford Reservoir and 73,000 acre-feet in the Arkadelphia Reservoir, these damages could be reduced. Practically all of the damages could be eliminated by levees and flood walls which could be considered as an alternative on an independent basis or in combination with upstream reservoir development for flood control. These possibilities are also being considered in the other previously discussed studies in the Mobile District. On the left bank of the Black Warrior River in Tuscaloosa a levee and flood wall system about 21,800 feet long containing five pumping stations could protect urban development (primarily industrial) from floods on the river. Also, on the opposite bank in Northport another levee and flood wall system about 9,300 feet long containing two pumping stations and appurtanent drainage facilities could protect urban development (primarily residential). In addition to lands with existing urban developments in this area these levees would protect only about 50 acres of the 760 acres of undeveloped lands required for future growth. The levee alignments could be modified later, however, to take in more undeveloped land, if the need became urgent. The USDA watershed project on Little Sandy Creek, located near Tuscaloosa, would reduce agricultural damages by $3,000 annually.

The most serious water use problem in this growth center is pollution of the Black Warrior River. Municipal wastes and industrial effluents have degraded the quality of the river to the extent that further industrial development is severely limited. The standard proposed by the Alabama Water Improvement Commission for agricultural and industrial use of this reach of the river (in the pool of William Bacon Oliver Lock and Dam) is 2 mgl of D.O. In order to provide for potential growth of the area, treatment of wastes at their source for a minimum 85 percent BOD removal will be required in addition to 371,000 acre-feet of reservoir storage for low flow augmentation to dilute the residuals. This storage could be provided in the Arkadelphia and Smiths Ford Reservoirs. The distribution of storage between these two reservoirs should be such that a minimum of 94,000 acre-feet of storage is included in the Smith Ford Reservoir for dilution of wastes in the Locust Fork from the Birmingham SMSA.

<u>Other and Summary</u>

In addition to Birmingham and Tuscaloosa (including Northport), there are several smaller urban centers such as Jasper, Cullman and Cordova which would benefit from water resources development in the Black Warrior Basin. In order to maintain and enhance the potential of the basin for economic growth and development, it is important that

the existing navigation project on the Black Warrior River, which has played a major role in industrial growth of the basin, be maintained and operated in a manner to meet present-day tow-boat requirements. A new single-lift lock at the John Hollis Bankhead Dam designed to meet these requirements is expected to be completed by 1980. The lock at the William Bacon Oliver Dam at Tuscaloosa (present dimensions 95' x 450') will then be the only sub-standard structure in the entire Black Warrior and Tombigbee River system. Studies in response to a resolution adopted 21 April 1950 by the Public Works Committee of the House of Representatives are planned for initiation late in 1969 in the Mobile District to determine the feasibility of replacing this lock.

From the foregoing discussion of the Black Warrior Basin, it is apparent that the most urgent growth center problems for solution are water supply and water quality control in the Birmingham SMSA and flood control and water quality control in the Tuscaloosa growth center. There is also a growing need for a new lock at Oliver Dam of the same dimensions as other structures on the Black Warrior-Tombigbee Waterway. The structures and programs that have been described would essentially meet these needs in the growth center nuclei to the extent that they would not be serious inhibiting factors to economic growth and development. Development of the Arkadelphia and Smiths Ford Reservoir sites for flood control, water supply and water quality control, would reduce the possibility of hydropower generation at these sites which have a good hydropower potential. A hydropower capacity of about 20,000 kw could be developed at the Blountsville Reservoir site on the Locust Fork which controls a drainage area of 274 square miles. Other potential reservoir sites on tributary streams of the Black Warrior River (Lost and Blackwater Creeks) are suitable for additional recreation development. In the case of the degraded tributaries of the Locust Fork in Birmingham (Five Mile, Valley, Village Creeks), full treatment of wastes discharged into the streams to remove essentially all pollutants would provide almost a total solution to the local problem, as well as most of the Locust Fork problem. This would be dependent upon the development of high-degree treatment techniques within a practical cost range. Without full treatment these streams during low flow periods do not have the assimilative capacity for adequate dilution of the wastes and reservoir storage for low flow augmentation is impracticable, if not impossible. There are also other areas of need on a smaller scale, such as a flood damage reduction on the Mulberry Fork at Cordova, which should be considered in planning the Arkadelphia site and on the local level or in connection with the development of upstream watershed projects. The USDA watershed project for Bristows Creek is the only existing USDA improvement of that type in the basin. An alternative watershed project for Little Sandy Creek is available for planning. This improvement would eliminate agricultural flood damages in the watershed of $3,000 annually. It would also provide other needs beneficial to the economy of the nucleus of the Tuscaloosa growth center.

As discussed previously, studies by the Corps of Engineers for flood control, water supply, water quality control, hydropower, recreation and related purposes in the Black Warrior River Basin are presently in progress in the Mobile District under other authority. These studies, like those for the Chattahoochee River Basin, are dependent upon detailed investigations by other agencies, particularly by the Federal Water Quality Control Administration. Water quality control needs in terms of storage for flow augmentation in this report may change as current studies of these and other problems in the basin progress. The studies are planned for completion so that a report can be submitted to higher authority for review by 1970.

Basin Plan

The recommended plan for development of the water resources of the Black Warrior River Basin includes the following:

Projects in operation or expected to be in operation by 1980:

Corps of Engineers

John Hollis Bankhead Lock and Dam, Alabama (with modern lock)
Holt Lock and Dam, Alabama
William Bacon Oliver Lock and Dam, Alabama
Warrior Lock and Dam, Alabama

USDA Upstream Watershed Projects

Bristows Creek, Alabama

Private Water Resource Development

L. M. Smith Reservoir (APC), Alabama
Hydropower plants at Bankhead and Holt Dams
Inland Lake, Alabama

For continuing planning:

Corps of Engineers

Smiths Ford Reservoir, Alabama
Arkadelphia Reservoir, Alabama
Lock at William Bacon Oliver Dam, Alabama
Levees at Tuscaloosa-Northport, Alabama

USDA Upstream Water Projects

Little Sandy Creek, Alabama

Non-structural

Flood Plain Information Studies at:

Birmingham, Alabama (Locust Fork at Port Birmingham, in addition to current program)
Cordova, Alabama
Tuscaloosa-Northport, Alabama

Continuing Studies

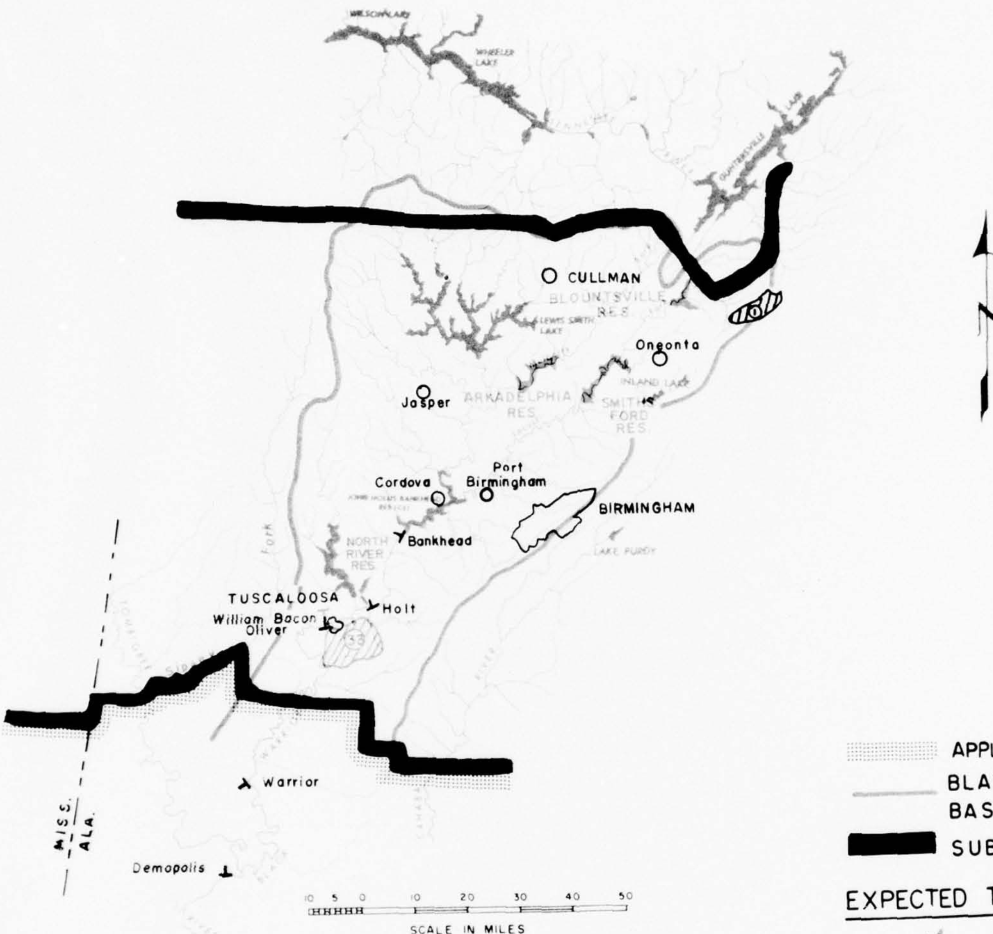
Since studies have been authorized by Congress for the Headwaters Area of the Black Warrior River Basin above Tuscaloosa for flood control and other water use needs, additional authority for study of this basin is not needed.

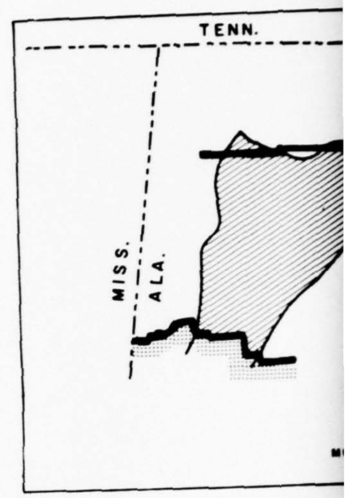
Table 10-15 shows the effectiveness of the selected plan in satisfying the navigation, flood control, water supply, water quality control problems of the growth centers. A map and schematic diagram of the various alternatives considered are shown on Figure 10-11.

TABLE 10-15
EFFECTIVENESS OF ALTERNATIVES CONSIDERED IN
BLACK WARRIOR RIVER BASIN, WATER SUB-REGION E

		OUTPUT OF ALTERNATIVE PROJECTS				
Item	Needs	Arkadelphia Reservoir	Smiths Ford Reservoir	Tuscaloosa Levee System	Unmet Needs	Indicated Future Studies
Water Supply (MGD)						
Birmingham	810	350	460		0	
Water Quality (1,000 AF)						
Birmingham	94		94[a]		0	Upstream Reservoirs. Advance treatment.
Tuscaloosa	371	277	b		0	Upstream Reservoirs. Advance treatment.
Navigation (1,000 tons)	22,982	(Met by existing Tombigbee-Black Warrior System)				Replacement of W. B. Oliver Lock.
Flood Control (Current damages - $1,000)						
Birmingham	34		34		0	Flood Plain Management.
Tuscaloosa	485			485	0	Upstream Impoundments, Levee System
Flood Control (Future urban land use in the flood plain - acres)						
Birmingham	1,870				1,870	Flood Plain Management.
Tuscaloosa	760			50	710	Levee System and Flood Plain Management.
Recreation days (1,000's)	61,840	5,446	3,276		53,118	Reservoir and Watershed Projects.
Performance Index #1		c	c	c		
Performance Index #2		c	c	c		

a Minimum, final plan may find additional storage practicable.
b Storage of 94,000 acre feet at Smiths Ford can be added to provide the needs of 371,000 acre feet.
c Studies now in progress for Headwaters of Black Warrior River will establish the index.





VICINITY MAP

LEGEND

APPLACHIAN REGIONAL BOUNDARY
BLACK WARRIOR RIVER BASIN BOUNDARY
SUB-REGION E BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR
UPSTREAM WATERSHED PROJECT

PLANNING ALTERNATIVES

MAJOR RESERVOIR
UPSTREAM WATERSHED PROJECT
LOCK REPLACEMENT

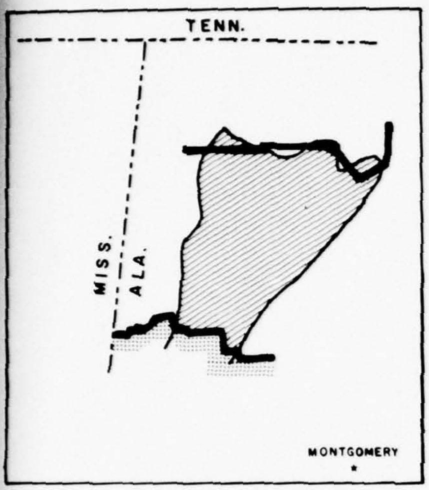
UPSTREAM WATERSHED PROJECT IDENTIFICATION

EXPECTED TO EXIST BY 1980
1 Bristows Creek

ALTERNATIVES AVAILABLE FOR PLANNING
33 Little Sandy Creek

BLACK WARRIOR RIVER BASIN
ALABAMA

LOCATION MAP



VICINITY MAP

LEGEND

AN REGIONAL BOUNDARY
ARRIOR RIVER
OUNDARY
SION E BOUNDARY

XIST BY 1980

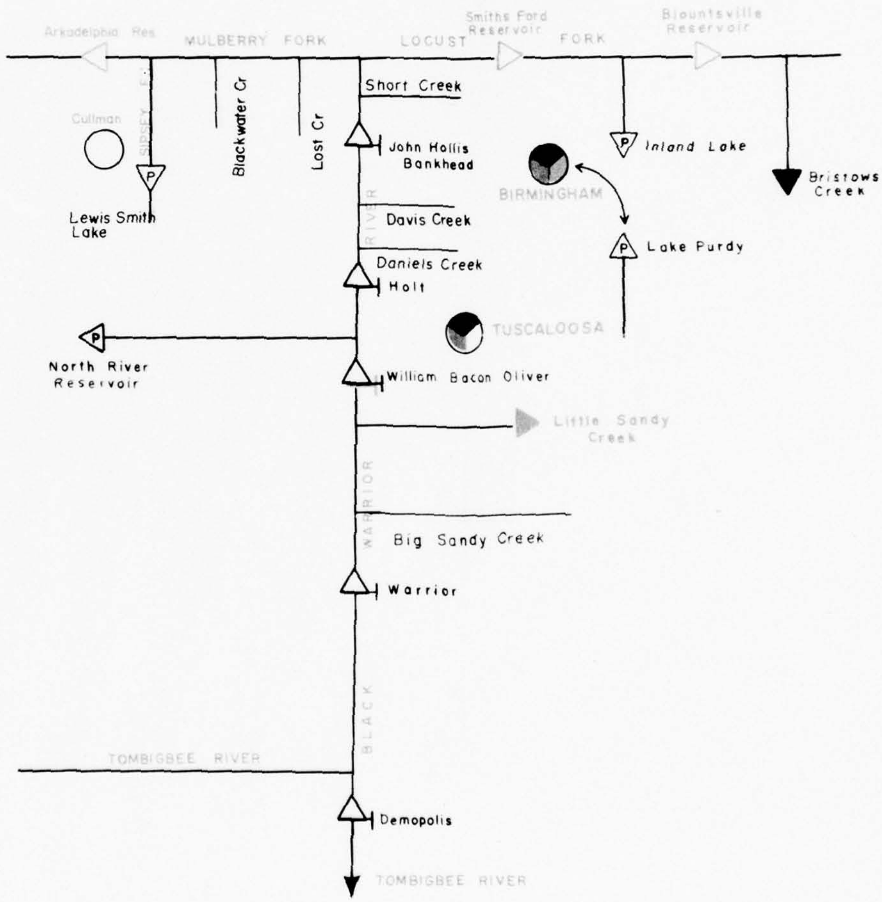
RESERVOIR
AM WATERSHED PROJECT

NATIVES

RESERVOIR
AM WATERSHED PROJECT
EPLACEMENT

R RIVER BASIN
AMA

N MAP



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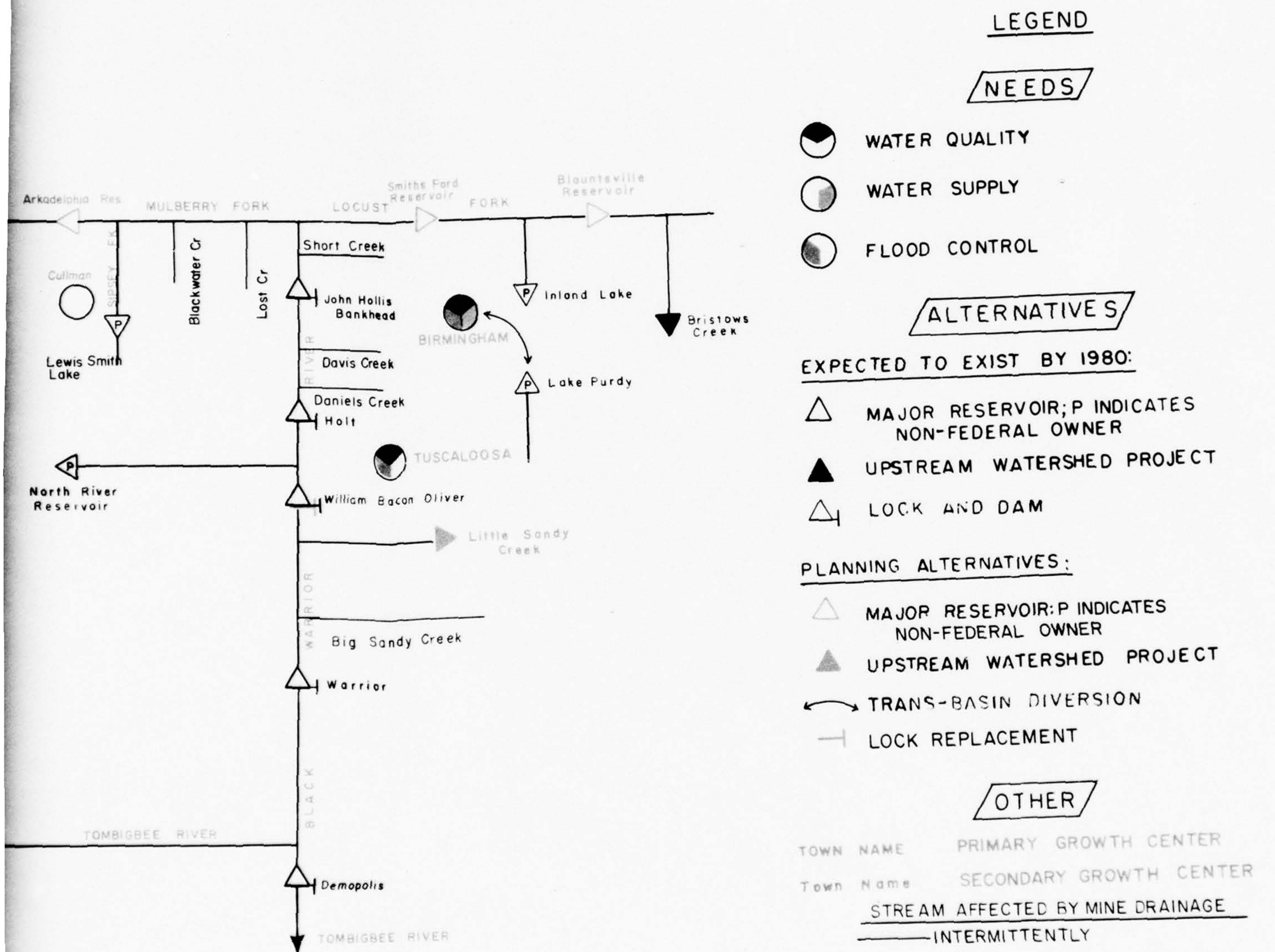

BLACK WARRIOR RIVER BASIN
ALABAMA

SCHEMATIC OF WATER NEEDS
AND
ALTERNATIVE SOLUTIONS

FIGURE 10-11

3

Tombigbee River Basin

The four areas of economic growth in the Tombgibee River Basin in Mississippi progressing downstream from the headwaters are Pontotoc-Tupelo-Fulton, Aberdeen-Amory and Columbus-Starkville-West Point and, in Alabama, Fayette-Vernon-Hamilton. Each of these growth areas contain two or more urban centers with similar economic characteristics which are interdependent for future growth and development.

A state supplement on the Mississippi portion of Appalachia is contained in Part V of this report which identifies water and related land resource projects needed in local areas for future growth. These projects include the Tennessee-Tombigbee Waterway and spur channels therefrom to potential growth center industrial sites. Water resource and related projects for immediate and future development that will assist the area to reach and maintain economic prosperity are listed therein. The Tennessee-Tombigbee Waterway is one of the Nation's major water resource projects expected to be essentially complete by 1980 that will affect all growth centers in Appalachian Mississippi by providing (1) an economical means of shipping and receiving bulk commodities; (2) about 36,000 acres of lake-type water surface area for recreation; (3) five large impoundments from which water supplies can be developed, limited only by non-interference with navigation interests; and, (4) a sizeable construction program in this mostly redevelopment area. This project contains: the river section, about 168 miles long; the canal section 300-foot bottom width, about 45 miles long; the divide section 280-foot bottom width, about 40 miles long; and, a total of 10 locks having chamber dimensions of 110 by 600 feet. The latest evaluation of project costs and benefits is contained in the Reevaluation of Project Economics, Supplement to General Design Memorandum on Tennessee-Tombigbee Waterway prepared by the Corps in 1966. This supplement is on file in the Office of Appalachian Studies. The Mississippi State Supplement clearly indicates that Mississippi's Appalachian Development program is keyed to early construction of the waterway. A discussion of the economic expansion effects of this project is provided after the following paragraphs on growth centers of the basin.

Pontotoc-Tupelo-Fulton-Baldwyn

A diagram showing the relative location of the growth center and the existing or potential units of development from which specified water needs of the basin above Amory can be met is shown below.

The Pontotoc area is located in an upland drainage divide area of the Tombigbee and Little Tallahatchie Rivers; Tupelo is located partially in the flood valley of Town Creek, a tributary of the Tombigbee River; Baldwyn is north of Tupelo and, Fulton is located to the east on the Tombigbee River but primarily outside the flood valley. Urban flood damages are presently concentrated in the Tupelo growth center. With continued urban growth, Tupelo and possibly Fulton will probably expand farther into the flood plains of major streams and

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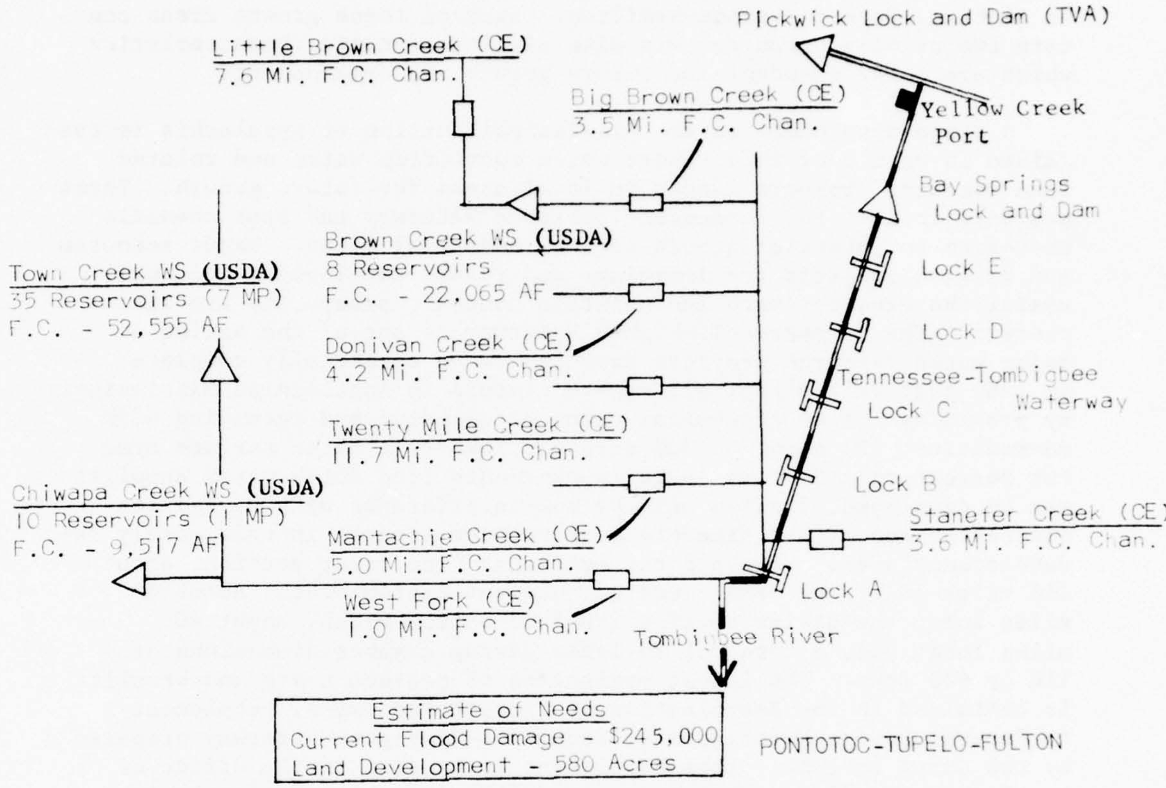


TOMBIGBEE RIVER ABOVE AMORY

flood damages may increase. Damages in the growth area are mainly to agriculture including farm improvements. Annual flood damage in the Town Creek watershed, including urban losses at Tupelo, amount to about $743,000 and the USDA's planned upstream watershed project would provide partial protection and reduce damages by about $498,000. Also, annual flood damage in the Chiwapa Creek watershed of about $360,000 could be reduced by about $275,000 with the implementation of the USDA's planned upstream watershed project for this creek. Pontotoc is in the extreme headwaters area of Chiwapa Creek and agricultural damages on this stream bear directly on its economy because the town is the primary trade and services center for residents and farmers of the watershed. Flood storage in the Town and Chiwapa Creeks upstream watershed projects of 62,072 acre-feet is contained in 45 impoundment structures. Twenty Mile and Mantachie Creeks enter the Tombigbee River from the right bank across the river from Fulton. Flood damages on these creeks of $255,000 annually, have been reduced by 16.7 miles of channel improvements to a residual of about $64,000

annually. The reduction of potential future urban damages in the Pontotoc-Tupelo-Fulton area could be obtained by establishment of a flood plain management program; adequate flood-free lands are available for these needs to the year 2020.

The needs for future water supplies in the Tombigbee River Basin above Amory can easily be met from available stream flow and ground water wells without surface-type impoundments. In some isolated cases it may be more economical to use impoundments due to high mineral content (poor water quality) and high pumping costs involved with ground water wells.

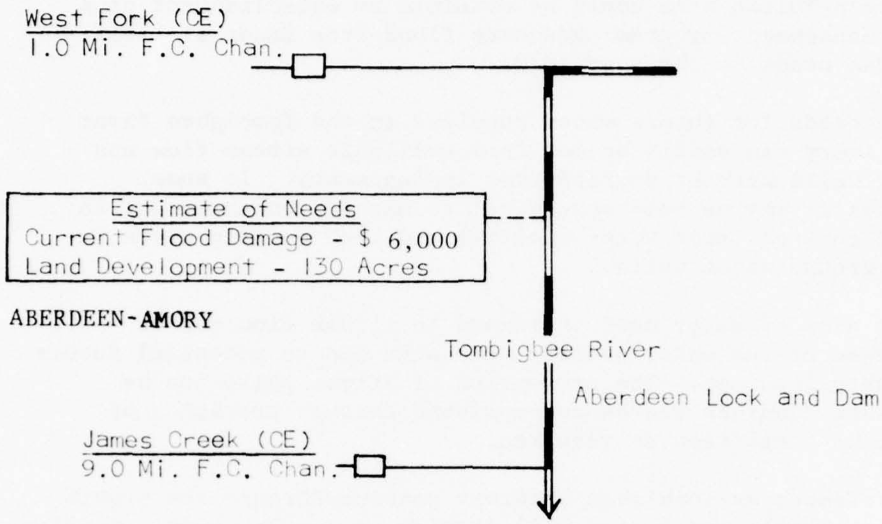
The area of major need in regard to stream flow may be the maintenance of the water quality standards due to potential future municipal waste loadings. The prevention of stream pollution by municipal waste loadings can be accomplished through provision of treatment plant facilities as required.

The Tennessee-Tombigbee Waterway passing through the growth center between Tupelo and Fulton will provide access for bulk commodity movements to and from the area. The waterway with adequate dock facilities in the area can be expected to offer advantages to new barge-related industries and the industrial economy of the Pontotoc-Tupelo-Fulton growth center is expected to become more diversified. Chapter 18, Part III of this report, presents details of studies of a terminal port in the growth area adjacent to the Tombigbee Basin at the upper end of the Tennessee-Tombigbee Waterway on the Yellow Creek arm of the Pickwick Dam Reservoir.

Aberdeen-Amory

The growth center, its specified water needs, and existing and potential units of development for the reach of the Tombigbee River between Amory and Aberdeen are depicted in the diagram below.

Amory and Aberdeen are located about 12 miles apart on or near the Tombigbee River. Urban development at Aberdeen has extended into the flood plan of the river and similar expansion may also occur in the future at Amory. Annual flood damages in the urban area at Aberdeen amounts to $6,000 annually. The reservoir formed by the Aberdeen Lock and Dam (Tennessee-Tombigbee Waterway) will inundate part of the rural damage reach while land acquisition and flowage easements required for the project will include other potential damage areas. Flood control improvements on Town Creek (West Fork) were constructed by the Corps in the 1930's and authority for additional straightening near the mouth was authorized in the 1950's. This new work consisting



TOMBIGBEE RIVER FROM AMORY TO ABERDEEN

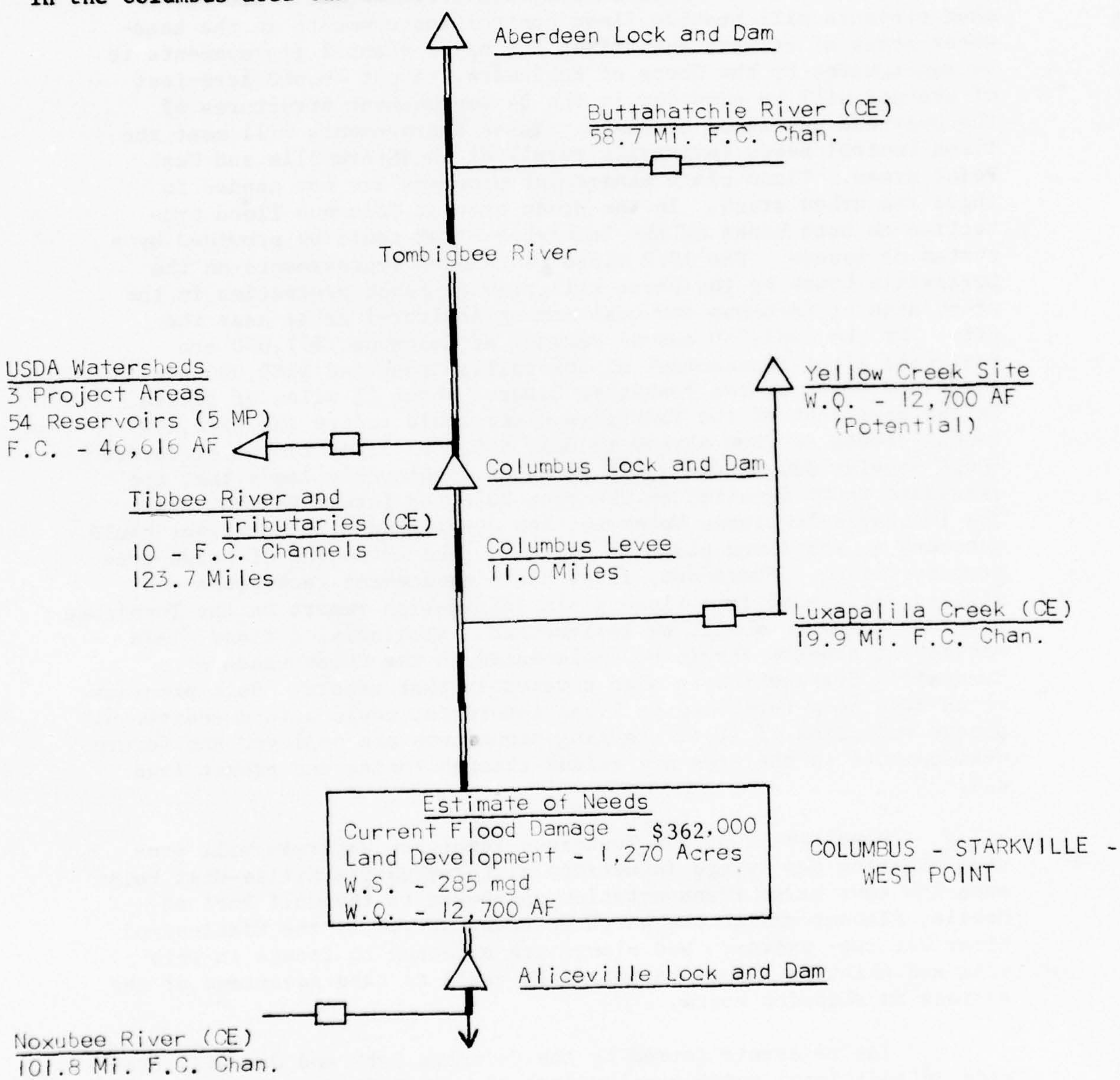
of about one mile of cutoff channel will offer some additional damage reduction in the agricultural area. The 9 miles of channel improvements on James Creek, made by the Corps of Engineers, provides protection to agriculture land and other improvements almost within the city limits of Aberdeen. Levee protection in the two urban centers would be possible, but a program of flood plain management appears to be a more logical solution for the prevention of flood damage based upon current and foreseeable future conditions.

The Tennessee-Tombigbee Waterway with public and private dock sites could generate a heavy industry-type economy in this area and some enhancement of the agricultural economy in the area could also be expected.

Water supply and maintenance of stream water quality in this growth center do not appear to be significant problems. The reservoir formed by the Aberdeen Lock and Dam introduced in the plan for Tennessee-Tombigbee Waterway may provide an economical source of future water supplies, but the continued use of ground water as the source of supply in this center is likely. Flowing artesian-type wells in Amory provide extremely economical municipal and industrial water supplies. However, in meeting the demands of the rural areas and smaller urban centers, it can be expected that use of the reservoir by rural water districts will occur prior to the year 2020. Municipal waste treatment facilities should provide secondary treatment of waste and new industries locating in the area should also be required to provide secondary treatment.

Columbus-Starkville-West Point

Shown in the diagram below are the growth centers, specified water use needs, and the existing or potential units of development from which these and other needs of the Tombigbee Basin in the Columbus area can be met.



TOMBIGBEE RIVER FROM ABERDEEN TO ALICEVILLE

Starkville and West Point are located in upland areas of the basin while Columbus lies partially in the flood plains of the Tombigbee River and its tributary, Luxapalila Creek. Substantial protection in the agricultural areas between Starkville and West Point will be provided when the Corps completes its 123.7 miles of channel improvements in the Tibbee River drainage basin and the SCS develops their three upstream watershed projects in this area. The watershed projects will provide flood control improvements in the headwater areas of streams authorized for major channel improvements to be constructed by the Corps of Engineers. About 46,600 acre-feet of storage will be provided in the 54 impoundment structures of the upstream watershed projects. These improvements will meet the flood control needs (primarily rural) of the Starkville and West Point areas. Flood plain management programs are not needed in these two urban areas. In the urban area at Columbus flood protection on both banks of the Tombigbee River could be provided by a system of levees. The 19.9 miles of channel improvements on the Luxapalila Creek by the Corps will provide flood protection in the urban area of Columbus and upstream agricultural areas near the city. Of the $362,000 annual damages at Columbus, $77,000 are residuals after improvement of Luxapalila Creek and $285,000 are in the flood plain of the Tombigbee River. About 11 miles of levees on the east bank of the Tombigbee River would reduce the $285,000 annual damage on that stream to only $29,000. This system of levees would provide 900 of the 1,270 acres of developable lands that are estimated to be required by the year 2020 for future growth. With the Tennessee-Tombigbee Waterway, new developments on the river could encroach on the flood plain in order to take advantage of barge-type transportation. Therefore, flood plain management techniques previously delineated in a flood plain information report on the Tombigbee River at Columbus should be implemented. Similarly, a flood plain management program should be implemented in the urban reach of Luxapalila Creek which is also covered in that report. Such programs, which have been furnished to local interests, could afford additional damage reduction if flood proofing techniques are employed and future developments in the area are guided through zoning and proper land use.

Development of the Tennessee-Tombigbee Waterway will provide existing and future industries at Columbus-Starkville-West Point area low cost barge transportation southward to the Gulf Port at Mobile, Alabama and to the north in areas served by the Mississippi River Waterway system. New plants are expected to locate in this area and existing plants to expand in order to take advantage of the savings in shipping costs.

The reservoir formed by the Columbus Lock and Dam will provide an additional water supply source for municipal and industrial use in the area. However, existing stream flow and ground water growth are generally adequate to meet the future needs.

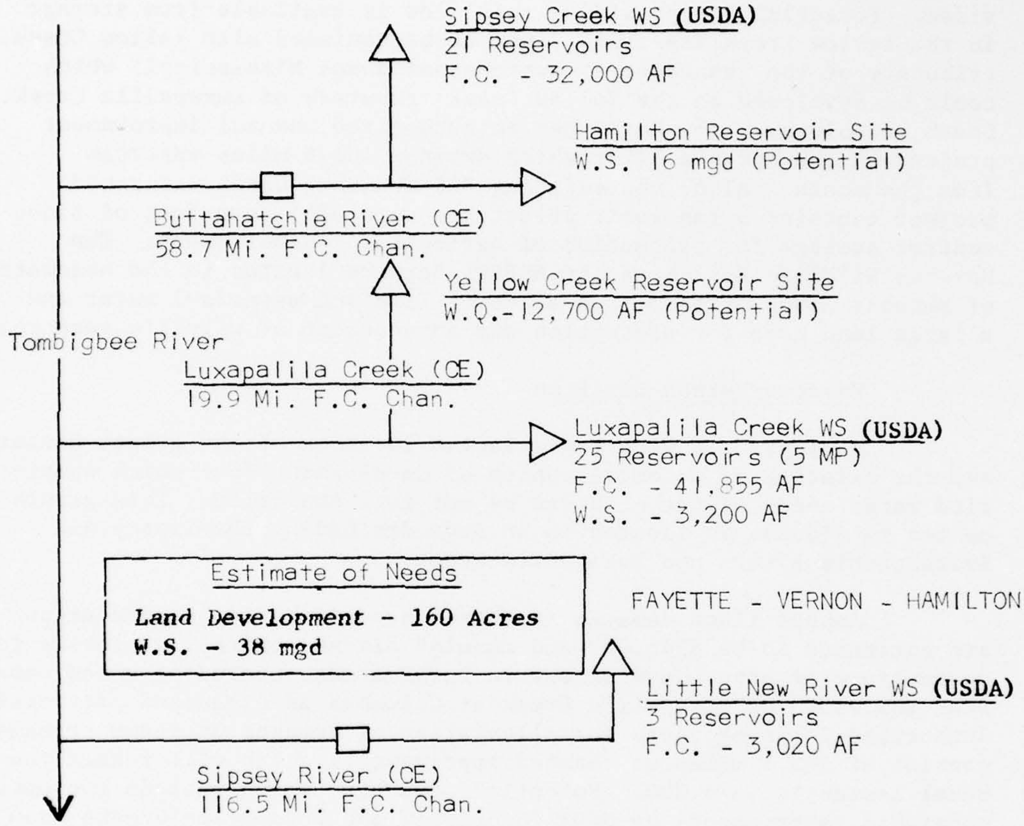
The maintenance of stream water quality in Luxapalila Creek to the year 2020 will require flow augmentation from reservoir storage of 12,700 acre-feet after secondary treatment has been provided. Potential for providing this flow is available from storage in the Yellow Creek Reservoir, (not to be confused with Yellow Creek, tributary of the Tennessee in extreme northeast Mississippi) which could be developed on the Yellow Creek tributary of Luxapalila Creek. South of Columbus, the Corps has an authorized channel improvement project on the Noxubee River which extends 101.8 miles upstream from the mouth. Also, the existing SCS Shammack Creek watershed project contains 5 reservoir structures with 1855 acre-feet of flood control storage for protection of agricultural development. The Noxubee Wildlife Refuge of the BSF&WL Service located in the headwaters of Noxubee River offers 1,200 acres of fish and waterfowl water and a large land area for protection and enhancement of wildlife resources.

Fayette-Vernon-Hamilton

A diagram showing the relative location of the growth center and the existing or potential units of development from which specified water needs of the area can be met is shown below. This growth center in Alabama is located in an area drained by the Sipsey and Buttahatchie Rivers and Luxapalila Creek.

Annual flood damages in these three tributary stream areas are estimated to be $545,000 and consist almost entirely of losses to agriculture or other development in rural areas, excluding urban damages near the mouth of Luxapalila Creek at Columbus as discussed previously. Authorized Corps projects for alleviation of damages on these streams consist of 195.1 miles of channel improvements which will reduce the rural losses to $375,000. Potential projects, which include two upstream watershed improvements by USDA for Sipsey and Luxapalila Creeks, would have 46 impoundment structures and would further reduce these damages to $243,000. One of these watershed projects would, in addition to reducing flood damages by $31,000, provide other water uses for the small urban centers of Guin, Winfield and Millport. Due to the urban centers being located outside the flood plains of these tributaries of the Tombigbee River, flood damages are small or non-existent. As discussed in the preceding paragraphs, urban damages occur near the mouth of Luxapalila Creek at Columbus, Mississippi.

Ground water is presently an economical source of water supply for urban and rural users of this area. Major water using industry, such as flood processing, may in the future require such a large quantity of water that a shift from ground supplies to surface impoundment will be required. Hamilton Reservoir on Buttahatchie River can easily meet the needs of 16 mgd and could be formulated to meet the gross demand of 38 mgd. Water supply sources for other urban and rural areas of the growth area, such as Guin, Winfield and Millport, could be provided to 1980 by five multi-purpose structures in the USDA's upstream watershed project on Luxapalila Creek.



TRIBUTARIES OF THE TOMBIGBEE RIVER IN ALABAMA

Treatment of all waste entering the streams in the Fayette-Vernon-Hamilton growth center to secondary level must be provided in order to maintain the quality of water in the streams. Flow augmentation for these streams in the growth center is not presently needed, but a plan for the Hamilton Reservoir could be formulated to include storage for that purpose when the need arises. The potential Yellow Creek Reservoir, located on a tributary of Luxapalila Creek to the south of the growth area, would provide residents additional water surface area for recreation. In the upstream watershed project on Luxapalila Creek, the Soil Conservation Service found potential for 11,120 acre-feet of additional beneficial storage

which could be used for stream flow augmentation for maintenance of water quality in the Guin-Winfield area, if the need arises. Potential for flow augmentation storage above the urban center of Fayette, Alabama, on the Sipsey River, would be limited to small reservoir structures of the type associated with USDA upstream watershed projects.

Tennessee-Tombigbee Waterway

Considerable study and planning for water resources development have been undertaken in the Tombigbee River Basin by the Tombigbee River Valley Water Management District, and one of their major tasks in connection with the Appalachian program has been the evaluation of project associated impact of the Tennessee-Tombigbee Waterway. In making this evaluation for the Management District, the Mississippi Research and Development Center, with assistance from the Corps of Engineers and others, prepared a report in 1967 entitled "An Evaluation of the Water-Related Economic Resource Development of Appalachia-in-Mississippi." This report, which is on file in the Office of Appalachian Studies, is a comprehensive plan that has also been used as the basis for the Mississippi State Appalachian Investment Plan. It clearly demonstrates that early construction of the Tennessee-Tombigbee Waterway is a necessary element in carrying out a successful Appalachian program in Mississippi. From this report on Mississippi Appalachia, the project associated investments and benefits have been extracted and are discussed in the following paragraphs.

The project associated impact costs (investments in industrial, commercial, residential and public service land and facilities, other than the waterway itself) estimated for 20-year intervals from 1970 through 2020 include both Federal and non-Federal investments. In converting these investments to annual equivalents it was assumed that (a) they were uniform during each year of the 20-year intervals; (b) buildings and fixed facilities would have a 50-year life; and, (c) equipment would have a 25-year life. The present worth of the investments was computed for 1975 based on 3 1/4 percent interest, and the amortization of investments over a 50-year project life was computed based on 5 percent and 3 1/4 percent interest for the non-Federal and Federal portions, respectively. These project associated impact costs are given below:

Item	Value in $1,000 Federal	Non-Federal	Total
Total initial investment from 1970 to 2020	114,060	2,557,900	2,671,960
Present worth of investments	102,508	1,805,541	1,908,049
Annual charges	4,175	98,902	103,077

Benefits from the above investments in the form of wages for employed persons in new industrial plants and commerical establishments or expansion of existing development of this type amount to $495.9 million annually. A small portion of these benefits, about $6.3 million, are assignable to the national interest since many of the unemployed and underemployed would become part of the wage earning labor force.

Other

The four growth centers described in the preceding paragraphs dominate the urban development within the basin. There are a few towns along the perimeter of the basin that generally serve as the market places for various products of the surrounding agricultural area, but the basin as a whole is predominantly rural in character with agriculture, including livestock raising, being the main source of income.

With the notable exception of Columbus, and to lesser degree of Aberdeen and Amory, other growth centers are not subject to mainstream flooding. But Columbus, because of its location at the confluence of Tombigbee River and Luxapalila Creek, is especially vulnerable to frequent floodings from both streams. While future land use and development in the flood plain should be regulated to prevent flood damage to future development, structural measures consisting of leeves are deemed necessary for protection of existing improvements in part of the city area to provide developable lands for continued growth.

One potential water resource problem not assigned to individual growth centers of the basin is that of stream or surface water pollution in agricultural areas where insecticides, pesticides, etc. are used and could have accumulated high residues. These chemicals which are carried to the streams by rainfall runoff are toxic to fish and some losses in this resource occur in the basin. The known areas of concern are in the Buttahatchie River and Luxapalila Creek tributaries (Fayette, Marion, Lamar and Pickens Counties, Alabama) where cotton and other crops require extensive use of chemicals for control of insects and plant diseases. Based on projected future land use which indicates a reduction in cropland acreage in this portion of the basin, it is possible that ill effects from this source of pollution may be mitigated and stream pollution from this source would not intensify in the future. The need for corrective measures and programs for preventing agricultural pollution is the responsibility of local interests in cooperation with the USDA.

Although the Aberdeen-Amory growth center is bisected by the Tombigbee River, most of the urban development is outside of the flood plain and the flood damages are not serious. However, in all future development of lands where the flood damage risks appear to be of significant proportions, a flood plain management program should be

developed. A large part of the flood damages, within and beyond the limits of the growth centers, occurs in the rural areas along the tributary streams of the Tombigee River. Because floods on the tributary streams are caused by high intensity local storms and generally occur during the growing or harvesting season, the average annual damages are high, about $2,000,000.

The Flood Control Act of 1958 authorized the Corps of Engineers to construct flood control projects on 22 tributary streams of the upper Tombigbee River. These projects consist of enlarging and straightening of about 465 miles of channels, including cutoffs, and removing of snags, drifts and other obstructions to stream flow. These improvements will provide channels capable of handling the more frequent summer floods which account for about 90 percent of the damage now suffered. Consequently, this will permit more intensive agricultural use of the flood plain and a possibility of greater return on investment. Improvements have been completed on six of the streams and completion of the remaining projects is scheduled by 1980.

The U.S. Department of Agriculture has an active watershed program underway in the Tombigbee River Basin. Three of the smaller projects consisting of 10 structures and about 18 miles of channel improvements have been completed. The USDA's program consists of 293 small reservoir structures, including 13 multi-purpose reservoirs, and is capable of storing about 340,000 acre-feet of flood water which is equal to about 5.4 inches of rainfall runoff over the watershed areas. The 13 multi-purpose impoundments also provide about 20,000 acre-feet of storage for water supply, recreation or other purposes. In addition to the storage reservoirs, about 1878 miles of channel improvement would complete the initial program. Also, two other projects which would consist of about 50 structures that would store about 75,000 acre-feet of flood waters are available for continuing planning. The USDA also has 27 watershed areas under investigation in connection with their river basin study program. Limited information on these projects are contained in Appendix A of the Appalachian Report.

Summary

The Tombigbee River Basin is located in the Coastal Plain where water supplies, both surface and sub-surface are generally abundant. It is an area of generally excellent aquifers and the development of large-capacity wells is relatively easy and inexpensive. There are many artesian flowing wells with discharges as great as 2500 gallons per minute. Infrequently only highly mineralized water is obtainable but in most areas the water is of good quality, and of low mineral content. Columbus is the only city of the growth areas in the Tombigbee River Basin that obtains its present water supply from a surface source,

Luxapalila Creek. The future water supplies for the Columbus-Starkville-West Point and the other growth centers within the basin except Fayette-Vernon-Hamilton can be met by the existing sources supplemented by the impoundments formed by the Columbus and Aberdeen Locks and Dams. Adequate water supplies for the rural areas can be best provided by a joint effort, such as an organization of rural water districts, to plan, develop and distribute the water supplies where the needs develop. It is expected that the present underground wells, together with the USDA water supply storage in upstream watershed projects and the Tennessee-Tombigbee Waterway reservoirs, would provide sufficient water supplies to satisfy most of the area's water needs to the year 2020. In the Mississippi Water Supplement (see Part V of this Report) 42 rural water associations and 20 municipal water systems are identified.

With the advent of the Tennessee-Tombigbee Waterway, and the economic emphasis inevitably shifting to manufacturing, problems of serious industrial pollution could occur. To prevent the deterioration of stream quality by industrial and municipal contaminants, basin-wide preventive measures should be introduced. These preventive measures would be accomplished through provision of waste treatment plant facilities to provide secondary treatment of industrial and municipal effluents at their sources.

If the municipalities and the industries provide secondary treatment of their wastes most of the streams could be maintained at an acceptable standard of quality without flow augmentations. The exception would be the lower Luxapalila Creek where flow augmentation storage of 12,700 acre-feet would be required. The Yellow Creek, a tributary of the Luxapalila Creek offers a potential developable site for providing the flow augmentation storage.

Upstream watershed projects in operation and underway in the Tombigbee River Basin include (see Figure 10-12):

Watershed Number	Name of Watershed	State
1	Bristows Creek	Alabama
3	Little New River	Alabama
1	Shammack Creek	Mississippi
3	Chiwapa Creek	Mississippi
4	Chuquatonchee Creek	Mississippi
11	Houlka Creek	Mississippi
19	Old Town Creek	Mississippi
26	Brown Creek	Mississippi

Alternative watershed projects available for planning include:

Watershed Number	Name of Watershed	State
22	Sipsey Creek	Alabama
34	Luxapalila Creek	Alabama

The Luxapalila Creek watershed project could serve as a potential future source of water supply to serve the needs of the Guin, Winfield and Millport areas in Alabama.

The U.S. Department of Agriculture also has 27 watershed areas in the Tombigee River Basin under investigation as a part of their river basin study program. Information on these projects is contained in Appendix A, Table XXXE and their locations are shown in the Alabama and Mississippi maps in the Map Folio (Volume 2).

Basin Plan

The recommended plan for the development of water resources in the upper Tombigbee River Basin would include the following features:

Projects completed or expected to be in operation by 1980:

Corps of Engineers
Tennessee-Tombigbee Waterway

Gainesville Lock & Dam
Aliceville Lock & Dam
Columbus Lock & Dam
Aberdeen Lock & Dam
Lock "A"
Lock "B"
Lock "C"
Lock "D"
Lock "E"
Bay Springs Lock & Dam

Flood Control Channels

Twenty Mile Creek
Mantachie Creek
Big Brown Creek
Donivan Creek
Stanefer Creek
James Creek
Luxapalila Creek
Tibbee River
Catalpa Creek
Little Brown Creek
Buttahatchie River
Chuquatonchee Creek
Houlka Creek
Cane Creek
Sun Creek
Line Creek

North Creek
North Canal
South Canal
Johnson Creek
Noxubee River
Sipsey River

USDA Watershed Projects

Bristows Creek, Alabama
Chiwapa Creek, Miss.
Chuquatonchee Creek, Miss.
Houlka Creek, Miss.
Old Town Creek, Miss.
Brown Creek, Miss.
Shammack Creek, Miss.
Little New River, Miss.
Line Creek, Miss.
Cane Creek, Miss.
Coldwater River, Miss.
Cypress and Puss Cuss Creek, Miss.
Duncan Cane Creek, Miss.
Fair Creek, Miss.
Grays Creek, Miss.
Hell Creek, Miss.
Little Spring-Ochswalla Creek, Miss.
Locks Creek, Miss.
Lower Tippah Creek, Miss.
Mill Creek, Miss.
Muddy Creek, Miss.
North Tippah Creek, Miss.
Oaklimeter Creek, Miss.
Pigeon Roost Creek, Miss.
Tallahago Creek, Miss.
Tuscumbia Creek, Miss.
Upper Skuna River, Miss.
Upper Tippah Creek, Miss.
West Hatchie River, Miss.

Department of Interior

Bluff Lake

For authorization:

USDA Watershed Project

Luxapalila Creek

For continuing planning:

Corps of Engineers

Levees at Columbus, Mississippi

USDA Watershed Project

Sipsey Creek
Line Creek

The U.S. Department of Agriculture also has 27 watershed areas in the Tombigbee River Basin under investigation as a part of their river basin study program. Information on these projects is contained in Appendix A, Table XXXE and their locations are shown in the Alabama and Mississippi maps in the Map Folio (Volume 2).

Non-structural

Flood Plain Information Studies at:

- Tupelo
- Fulton
- Aberdeen-Amory

Continuing Studies

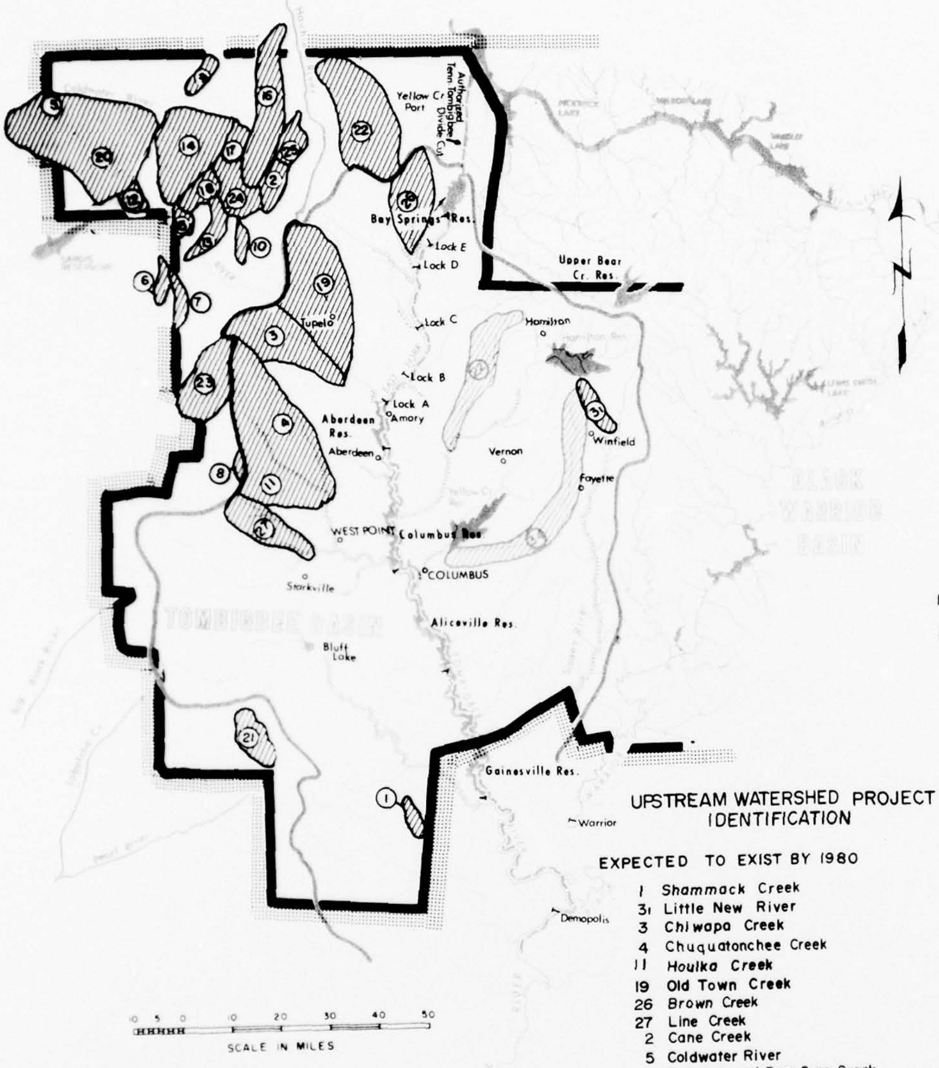
Since a survey of flood control and other water use needs of the Tombigbee River Basin is authorized by Congress, additional authority for water resource planning for the basin is not needed.

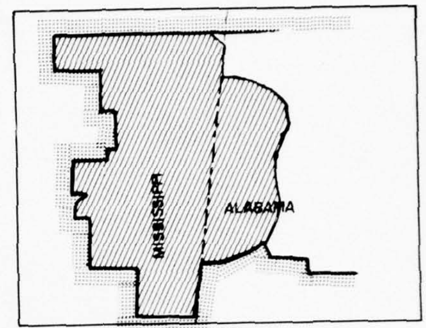
Table 10-16 shows the effectiveness of the selected plan in satisfying the flood control and other water use needs of the growth centers. A map and schematic diagram of the various alternatives considered are shown on Figure 10-12.

TABLE 10-16
EFFECTIVENESS OF ALTERNATIVES CONSIDERED
IN TOMBIGBEE RIVER BASIN, WATER SUB-REGION E

Item	Needs	OUTPUT OF ALTERNATIVE PROJECTS Luxapalia Cr. USDA	Hamilton Reservoir	Yellow Cr. Reservoir	Columbus Levee	Unmet Needs	Indicated Future Studies
Water Supply (MGD)							
Fayette-Vernon-Hamilton	16		16			0	
Water Quality (1,000 AF)							
Columbus-Starkville-West Point	12.7			12.7		0	
Flood Control (Current damages $1,000)							
Pontotoc-Tupelo-Fulton	245					245	Limited to Future Expansion of Upstream Watershed Project
Aberdeen-Amory	6					6	Local Protection
Columbus-Starkville-West Point	362				256	106	Additional Local Protection
Fayette-Vernon-Hamilton	44	31				13	Limited to Future Expansion of Upstream Watershed Project
Flood Control (Future urban land use in the flood plain - acres)							
Pontotoc-Tupelo-Fulton	580					580	Flood Plain Management
Aberdeen-Amory	130					130	Flood Plain Management
Columbus-Starkville-West Point	1,270				900	370	Flood Plain Management
Fayette-Vernon-Hamilton	160					160	Flood Plain Management
Corinth-Booneville-Iuka	410					410	Flood Plain Management
Recreation Days (1,000's)	20,870		550	632	0	19,788	
Performance Index #1		1.3	a/	a/	a/		
Performance Index #2		1.6	a/	a/	a/		

a/ Studies now in progress for Tombigbee River and Tributaries will establish the index.





VICINITY MAP

LEGEND

TOMBIGBEE RIVER BASIN BOUNDARY
WATER SUB-REGION E BOUNDARY
APPALACHIAN REGION BOUNDARY

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR AND LOCK
UPSTREAM WATERSHED
FLOOD CONTROL CHANNEL

PLANNING ALTERNATIVE

MAJOR RESERVOIR
UPSTREAM WATERSHED PROJECT
LOCAL PROTECTION

UPSTREAM WATERSHED PROJECT IDENTIFICATION

EXPECTED TO EXIST BY 1980

1 Shammack Creek
31 Little New River
3 Chiwapa Creek
4 Chuquatonchee Creek
11 Houlka Creek
19 Old Town Creek
26 Brown Creek
27 Line Creek
2 Cane Creek
5 Coldwater River
6 Cypress and Puss Cuss Creek
7 Duncan Cane Creek
8 Fair Creek
9 Grays Creek
10 Hell Creek
12 Little Spring-Ochewalla Creek
13 Locks Creek
14 Lower Tippah Creek
15 Mill Creek
16 Muddy Creek
17 North Tippah Creek
18 Oaklimeter Creek
20 Pigeon Roost Creek
21 Tallahago Creek
22 Tuscumbia Creek
23 Upper Skuna River
24 Upper Tippah Creek
25 West Hatchie River

ALTERNATIVES AVAILABLE FOR PLANNING

22 Sipsey Creek
34 Luxapalila Creek

TOMBIGBEE RIVER BASIN
MISSISSIPPI AND ALABAMA

LOCATION MAP

MAP

EGEND

BEE RIVER BASIN BOUNDARY
SUB-REGION E BOUNDARY
CHIAN REGION BOUNDARY

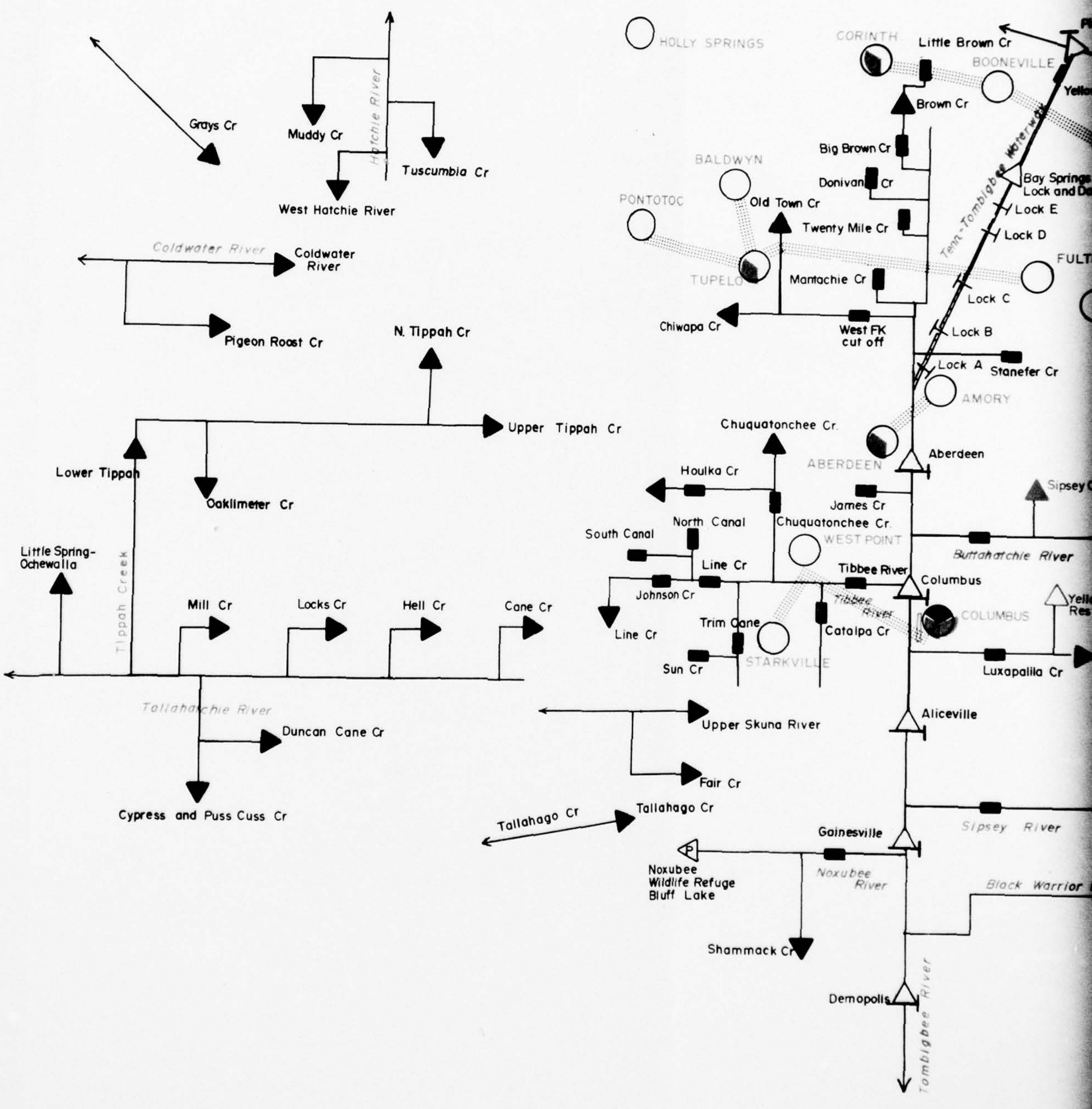
EXIST BY 1980

RESERVOIR AND LOCK
EAM WATERSHED
CONTROL CHANNEL
RNATIVE

RESERVOIR
EAM WATERSHED PROJECT
PROTECTION

BIGBEE RIVER BASIN
ISSISSIPPI AND ALABAMA

CATION MAP



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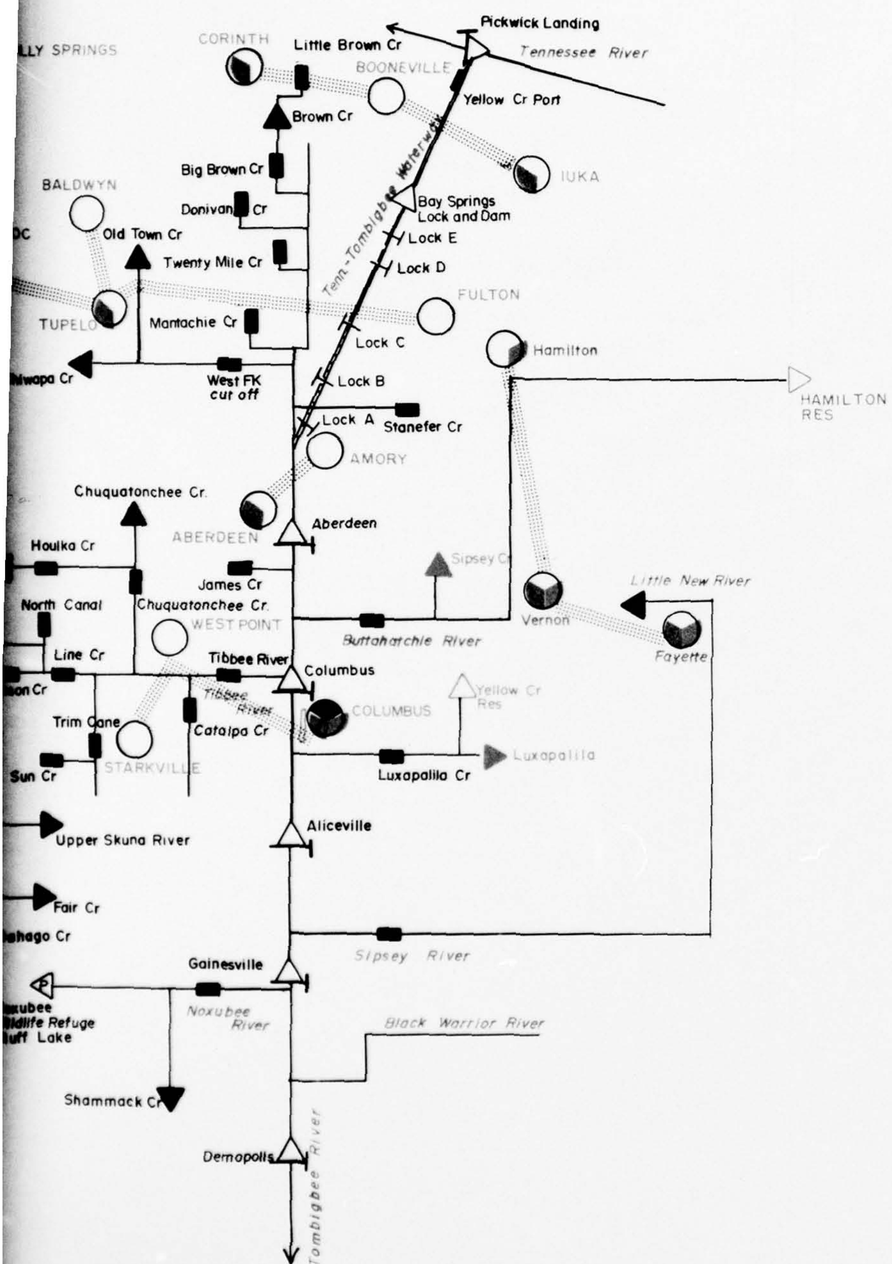

LEGEND

NEEDS

WATER QUALITY

WATER SUPPLY

FLOOD CONTROL

ALTERNATIVES

EXPECTED TO EXIST BY 1980

MAJOR RESERVOIR; P INDICATES NON-FEDERAL OWNER

UPSTREAM WATERSHED PROJECT

NAVIGATION LOCK

NAVIGABLE CHANNEL

FLOOD CONTROL CHANNEL

PLANNING ALTERNATIVES

MAJOR RESERVOIR; P INDICATES NON-FEDERAL OWNER

UPSTREAM WATERSHED PROJECT

LPP PROJECT

OTHER

TOWN NAME PRIMARY GROWTH CENTER

Town Name SECONDARY GROWTH CENTER

TOMBIGBEE RIVER BASIN
MISSISSIPPI AND ALABAMA

SCHEMATIC OF WATER NEEDS AND ALTERNATIVE SOLUTIONS

II-10-141 FIGURE -10-12

3

Other River Basin Areas

Included in the following paragraphs are discussions of water resource measures required to meet the needs of the Savannah and Tennessee River Basins (Hiwassee River Tributary Basin areas) and several basin areas in the Mississippi portion of the sub-region, excluding the Tombigbee River.

Savannah River Basin

The basin growth area for which water resource measures are discussed (Toccoa-Cornelia-Clarksville) is partially located in the Chattahoochee River Basin and is therefore discussed below in two parts: Toccoa and Cornelia-Clarksville. See Figure 10-8 for the location of projects in this area.

Toccoa-Cronelia-Clarksville

As discussed previously in this report the water use needs of the Toccoa portion of the growth center are primarily related to meeting future water supply demands. It appears that a new source should be considered in meeting the future municipal and industrial water demands. Minimum flows in the Tugaloo River, tributary of the Savannah River, in the vicinity of Toccoa greatly exceed the water needs of about 12 mgd and, due to its good quality and nearness to the urban center, it should be planned as a source for municipal water supply. The USDA watershed projects and other existing or potential structural improvements in the Toccoa area are discussed in Chapter 8, Part II of this report.

In providing the water use needs of the Cornelia and Clarksville areas until 1990, the USDA's existing upstream watershed project on Hazel Creek and the one now being planned for the Soque River should provide the identified needs. Flood damages in the Hazel Creek watershed of $11,050 annually have been reduced to about $3,700 by structural improvements.

Tennessee River Basin (Hiwassee River Tributary)

An emphasis has been placed on the scenic and outdoor recreation potential of north Georgia and it is apparent that water resource development plans for this area should include provision for additional recreational opportunities. The major portion of this section of the Tennessee Valley area lies within the Chattahoochee National Forest. The Forest Service has 6 special project areas in Sub-region E that they recommend for future development. One of the 6 is a million dollar recreation complex at TVA's Nottely Reservoir, and another in

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this area is a 2 1/4 million dollar recreation complex involving two small lakes and other land and facilities. These projects are included in the Appalachian Regional Commission's Highlands Recreation Study. The USDA, in cooperation with local interests, has constructed the Hightower Creek Upstream Watershed project and the Hiwassee River and Head of the Tennessee River projects are authorized for construction. In addition, Young Cane Creek watershed has been investigated for the report. Plans for the Hiwassee River project include storage for recreation. Annual flood damage in these three project areas amounts to $46,700 and will be reduced by $21,200 by 1980 by the Hightower Creek and Hiwassee River projects. An additional reduction of $16,800 could be accomplished by the project on Young Cane Creek. See Figure 10-9 for the location of projects in this area.

The Tennessee Valley Authority has three dams in this area (Chatuge, Nottely, Blue Ridge) whose reservoirs have an aggregate surface area of about 14,500 acres at full pool. In serving the flood control and power purposes for which they were built, these projects can have a substantial seasonal drawdown, but only a minor part of this drawdown occurs during the prime recreation season. Yet, in view of the projected important role of recreation in this mountainous area, further study of the recreational potential of these projects is desirable. Such study would assess the loss to other project purposes as compared with the gain for recreation, the need for additional recreation facilities, and the possibility of reallocating project costs to recreation.

Mississippi Area Streams

These streams in Mississippi: Hatchie, Coldwater, Tallahatchie, Big Black and Pearl River are exclusive of the Tombigbee River Basin area for which the water resource plan was discussed in preceding paragraphs. See Figure 10-11 for the location of projects in this area.

Corinth-Booneville-Iuka

Since most of the water use needs of the growth area are being provided by USDA upstream watershed projects, an abundant supply of groundwater, and the Tennessee-Tombigbee Waterway which would be virtually completed by 1980, additional water resource measures in this area are not urgently needed. The major area of concern lies in holding future flood damages along area streams in the urban areas to a minimum. To accomplish this, flood plain information data and reports are needed for Corinth and Iuka. By 1980, after installation of the four USDA upstream watershed projects (West Hatchie River and Tuscumbia, Muddy and Grays Creeks), flood damage in these areas will amount to about $210,400 annually. Construction of a port on the Yellow Creek embayment of the Tennessee River would permit this growth center to participate in the industrial development that is occurring elsewhere along the

waterway. As proposed by the Tennessee Valley Authority in Chapter 18, this port facility could attract new industries employing more than 2,800 persons and provide an annual payroll of more than $20 million. In addition, it would provide savings in transportation costs for existing industries in the vicinity amounting to $175,000 annually. The proposed port would be a joint venture between the Federal government and state and local agencies.

Holly Springs

An abundant supply of groundwater for municipal and industrial use and adequate treatment of waste loadings at their sources indicates no foreseeable problems in the growth center related to their water uses. By 1980 residual flood damages in the 13 upstream watersheds of the growth area will amount to $342,200 after installation of the USDA's structures. The Forest Service is not proposing additional recreation improvements in the Holly Springs Forest in this report.

Other

Annual flood damages in the upper Skuna River and Fair and Tallahago Creek upstream watersheds will, by the year 1980, be reduced by structural measures included in the plans by USDA to $15,300.

Summary

In addition to the Yellow Creek Port project, other needs and plans in the fringe areas of Appalachian Mississippi are related to recreation and flood protection in upstream watersheds. The future water supply needs of the Cornelia-Clarksville area of Georgia can be considered by the Corps in current studies for the Apalachicola, Chattahoochee and Flint "308" report. Flood plain information reports should be prepared for the Corinth and Iuka areas.

13. THE SYSTEM - SUB-REGIONAL - GENERAL

Navigation

The Nation's inland waterways play an important role in economic development. In Water Sub-region E, the existing waterway on the Tombigbee and Black Warrior Rivers has been an important factor in the growth of the Tuscaloosa and Birmingham, Alabama areas. The waterway under construction on the Alabama River is expected to assist future growth in the southern edge of the sub-region in the Montgomery, Alabama area. A tremendous volume of commerce has also been estimated to move over the Tennessee-Tombigbee Waterway in the western part of the sub-region. These waterways now or will provide barge access to the deep-water port on the Gulf of Mexico at Mobile, Alabama for growth

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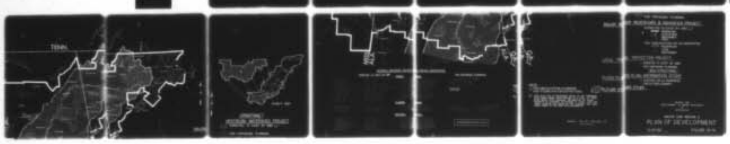

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centers of the sub-region, other southern communities and other Appalachian areas to the north in the Tennessee and Ohio River Valleys. Also, all of the waterways connect with the Gulf Intracoastal Canal System at Mobile to provide access for movement of commerce along most of the Gulf of Mexico to the major cities of Houston, Texas, New Orleans, Louisiana and Tampa, Florida.

The future growth of industry in Gadsden, Alabama and Rome, Georgia can be substantially enhanced by the development of the Coosa River for navigation from Montgomery, Alabama to Rome, Georgia. In addition to providing barge transportation for industries in the Coosa River Valley, development of the Coosa River navigation project, consisting of the installation of locks at six existing privately-owned hydropower dams, would enhance the recreational aspects of the Coosa River. This project would afford boating opportunities over some 600 miles of continuous stream impoundments and open waterways from Rome, Georgia to the Gulf of Mexico. This project has been fully investigated and reanalyzed as part of the Appalachian Survey and found to be economically justified when considered from both the national and regional viewpoints. This project should now be programmed for advance planning and engineering to begin in Fiscal Year 1971.

Additional potential for navigation development exists on the Chattahoochee River above Columbus, Georgia to Atlanta. This would be an extension of the Apalachicola, Chattahoochee and Flint River System which presently ends on the Chattahoochee at Columbus. For this system, the deep water port of Port St. Joe, Florida serves as the overseas terminal for barge commerce. Port St. Joe is also seated on the Gulf Intracoastal Canal System. The potential Chattahoochee Waterway, which would serve Atlanta and areas downstream, is being investigated by the Corps of Engineers under separate authority (Apalachicola, Chattahoochee and Flint River "308" report).

One of the immediate needs for navigation, as related to the objectives of the Appalachian Program, is the replacement of the outmoded Bankhead Lock. The stability of this lock, which is the uppermost structure on the Tombigbee and Black Warrior Waterway, is questionable. Analysis indicates that the upper chamber river wall is in danger of failure if not supported by the 4 foot thick concrete floor. The original design did not contemplate use of the floor slab this way. Strengthening certain portions of the lock are being planned to assure continued use until a new lock can be constructed and put into operation. A sudden failure of a lock wall would completely disrupt traffic on the waterway for several years while a new lock was being constructed. If the failure should suddenly release most of the water stored in the Bankhead pool, a wave of water could be produced which could damage the new Holt Lock and Dam, cause extensive

property damage downstream and endanger human life. The President's budget for the Fiscal Year 1970 includes planning and construction funds for the initiation of the lock replacement.

Another critical navigation need in the water sub-region is the completion of the authorized Tennessee-Tombigbee Waterway for which initial advanced engineering and planning funds have been made available. The Waterway is an integral and necessary element of a comprehensive plan for the development of Appalachian Mississippi, (see Part V, Chapter 5, Mississippi Water Supplement). Thus, it is essential to continue advanced planning and construction to assure development of the Waterway in time to maintain growth comparable with the developmental potential of this part of Appalachia.

The Tennessee River Waterway, which borders the northeast corner of Mississippi, currently carries traffic in excess of 20 million tons. But development of a public port on Yellow Creek is necessary to permit the sub-region to receive a direct benefit from the Tennessee River Waterway and thus benefit from the locating of additional higher wage, water-oriented industries. When the Tennessee-Tombigbee project is completed, such a port would have an even greater economic impact in the area.

Water Supply, Water Quality Improvement, and Flood Control

In the preceding paragraphs the water supply problems that are now facing the identified growth centers and the needs that are expected to develop during the next 50 years have been discussed. These identified needs of 2,511 mgd can partially be satisfied by the recommended plan and can fully be realized with projects available for planning. This can generally be said for the Appalachian portion of the sub-region's four major basins and their growth centers insofar as it pertains to the elimination of serious flooding and for providing water quality needs. However, the sub-region as a whole has many towns, non-incorporated communities and rural areas that will be affected by all these problems. It is estimated that about 289 mgd of water supply for domestic and industrial purposes and 62,000 acre-feet of water storage for quality improvement will be needed in the non-identified area before 2020. Most of the needs in these areas can, and will, be supplied from improvements that comprise the recommended plan. Much of the water supply and flood protection can be furnished by upstream watershed improvements that either have been studied by the U.S. Department of Agriculture or will be studied, as the need arises. The improvements for which studies have been made are shown on Figure 10-14. Water supply requirements for both urban and rural use should be one of the prime purposes considered in all future investigations and plans, and the reports should furnish complete information concerning the sites where water can be impounded for this purpose, the amount of storage that could be made available, and the anticipated yield.

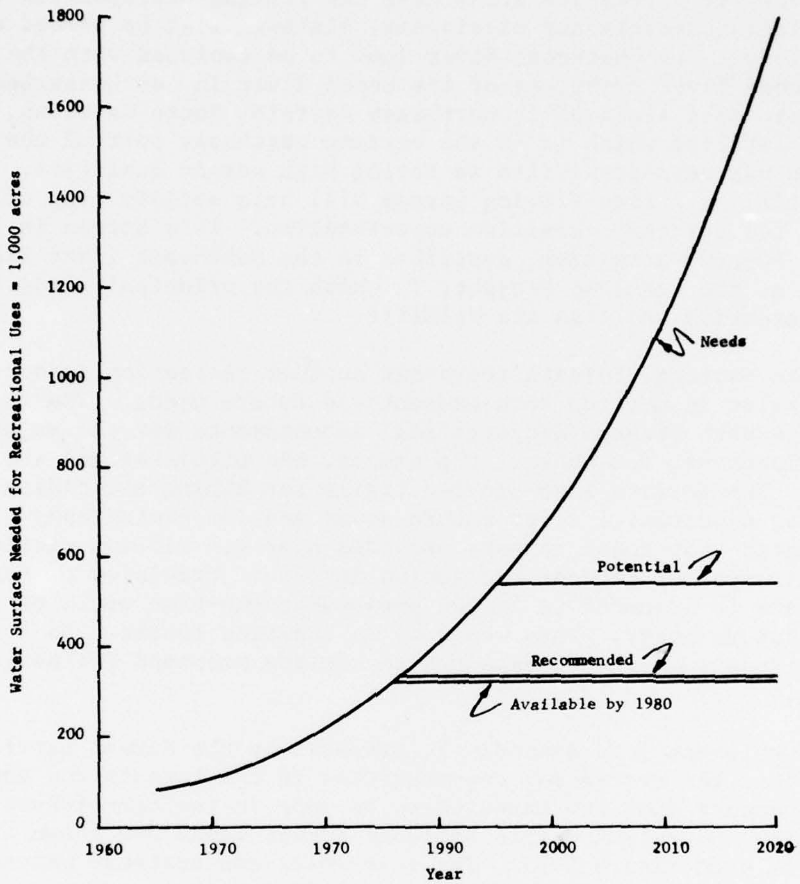
Water quality estimates, in areas not covered by definite project proposals, were based on short-cut procedures which are based on generalized assumptions. Detailed studies of assimilative capacity of localized streams could not be made within the time and monetary limitations of the study. However, the estimates should guide future investigations towards potential points of need and indicate the relative magnitude of needs. Dilution may not be a practical or economical alternative in many of the areas located very high in the drainage basins.

Recreation

The increase in needs for outdoor recreation, indicated in Figure 10-8, is based on BOR projections in Appendix F. A simplified estimate of water surface area required to meet needs for fishing, boating and swimming, based on BOR estimated relationships in 1980, is included in Figure 10-13. While the estimated availability omits water surface or rivers and streams and many small impoundments, the data indicates that the water sub-region has had enough development to meet all needs until about 1985 and the surface area of projects recommended in this report will approximately satisfy 1986 needs.

Based on present trends, the Bureau of Outdoor Recreation has estimated that by 2020 the water oriented recreation demand would be 235.5 million man days. If the same density of use as in 1980 is used as a measure, then 1.78 million acres of water surface would be required, equal to about 7 percent of the total land area of the sub-region. It appears that more intensive use of water surfaces and the surrounding areas will be required, including higher mid-week use than at present. The importance of investor-owned hydropower projects, in meeting outdoor recreation needs, is evident since over 50 percent of the water area available by 1980 will be furnished by those projects.

Additional water surfaces could result from the projects for future accomplishment which have been previously discussed by river basin. These projects could provide about 64,000 acres for recreation users. The recreational potential of large reservoirs considered in previous studies of the Alabama-Coosa Basin is about 140,645 water surface acres. Authority is available for continued study of this basin by the Corps of Engineers and will include planning for development of these reservoirs for recreation as well as other water uses. Upstream watershed programs of the Department of Agriculture also have potential for effective recreational development. Seventeen of the sub-region's 115 existing, authorized and identified potential upstream watershed projects include water related recreation as a project purpose. In the 115 watersheds, multi-purpose reservoirs would provide about 3,895 acres of water for recreation users. The Bureau of Outdoor



Available by 1980					
Corps of Engineers *TVA and Others*		Alabama and Georgia *Power and Other private*		Recommended	
Project	Area, ac	Project	Area, ac	Project	Area, ac
Allatoona	11,686	Thurlow	5,800	Dalton	8,650
Lake Sidney Lanier	38,000	Yates	19,900		
West Point	25,900	Martin Lake	39,184		
John Hollis Bankhead	9,050	Jordan Lake	6,628		
Holt	3,280	Mitchell Lake	5,850		
Carters	3,290	Lay Lake	11,790		
Blue Ridge	2,950	Logan Martin	15,260		
Notley	2,450	H. Neely Henry	11,235		
Chatuga	5,400	Weiss	30,200		
Upper Baer Creek	1,850	L. M. Smith Lake	21,200		
Bluff Lake	1,800	Burton Lake	2,775		
North River	5,885	Nacoochee Lake	240		
Lake Purdy	1,050	Rabun Lake	834		
Inland Lake	1,572	Tullalah Falls	63		
Gainesville Reservoir	7,200	Tugalo Lake	597		
Aliceville Reservoir	9,500	Yanah Lake	325		
Columbus Reservoir	7,700				
Aberdeen Reservoir	5,000				
Bay Springs Reservoir	6,800				
Total	150,363		171,881		8,650

FIGURE 10-13 WATER SURFACE NEEDS AND SUPPLY FOR OUTDOOR RECREATION USE IN WATER SUB-REGION E

Recreation indicates that many small single-purpose reservoirs or high density recreation areas near the growing metropolitan centers of Atlanta, Georgia and Birmingham, Alabama, will be needed by the year 2020. The Chattooga River (not to be confused with the Chattooga River Tributary of the Coosa River in northwest Georgia and northeast Alabama) in northeast Georgia, South Carolina, and North Carolina which is in the extreme northeast part of the sub-region has been identified as having high scenic qualities. Its potential as a free-flowing stream will help satisfy many of the needs for outdoor recreation opportunities. This stream is located in an 805,000-acre area, described in the Southeast River Basin Study as the Highland Project, in which the principal purposes would be recreation and fish and wildlife.

The National Forests represent another recreation resource that can assist in meeting both present and future needs. The forests provide both streams and artifical impoundments for the enjoyment of the fisherman, the hunter, the camper, the picnicker and the sight-seer. The forests also provide trails for hiking and riding, scenic drives, opportunities for nature study and for photography. It is estimated that these forests provided over 1.6 million visitor days of this type of outdoor recreation in 1966. Provision of facilities adequate to accommodate 34,000 persons-at-one-time would be needed to meet future needs. This would be in addition to the 2 to 5 million annual users which are expected to use the proposed Talladega Scenic Drive.

Supplement B to Appendix F, prepared by the Forest Service, describes the recreation opportunities in the forests and some of the improvements that are expected to be made in the near future. The location and extent of the National Forest lands are shown in Chapter 9 on Figure 9-13. The reservoirs and upstream watershed projects mentioned above are shown on Figure 10-14.

Conservation

Upstream watershed developments have been described in preceding paragraphs when discussing the problems and possible solutions of the various growth centers. However, there are many problems in the sub-region that revolve around floodwater damage, erosion and sediment damage, agricultural water management, and the management of cropland, grazing land, and forested areas. These are all problems that fall under the purview of the Department of Agriculture and particularly to the Soil Conservation and Forest Services. A discussion of these problems is included in the USDA's Appendix A to this report.

It is estimated that by 1980 in order to provide for the continued production of food and fiber from the sub-region, acceleration of current USDA programs will be required to provide needs as follows:

a. Adequately treat and protect 2,139,400 acres of cropland, improve 169,300 acres of pasture, and establish 202,520 acres of new pasture planting.

b. Stabilization of critical areas on 45,350 acres of roadbank and 2,110 acres of surface-mined areas.

c. Increase recreational and fish and wildlife opportunities by the construction of 656 farm ponds, management of 8,020 farm ponds for fish production, planting of 370 acres, construction of 521,800 linear feet of recreational access roads, development of 36,120 acres of wildlife habitat, and plan for wildlife habitat preservation of 417,010 acres, and develop 820 acres of picnic areas and 330 acres for camping areas.

d. Develop 12,330 basic conservation plans and complete detailed soil survey on 4,029,240 acres of land.

Accelerated land treatment measures on private forest and woodlands that can be undertaken by state or private landowners are as follows:

a. Plant 712,000 acres in trees.

b. Treat 392,000 acres for erosion control, mined area stabilization.

c. Treat 599,000 acres for hydrologic stand improvement, 385,000 acres of harvest cutting and 661,000 acres of grazing control.

d. Develop 6,700 forest and woodland management plans.

Planned accelerated land treatment and structural measures for National Forests include:

Tree planting	Acres	161,100
Timber stand improvement	Acres	274,950
Soil and Water:		
Gully Stabilization	Acres	200
Sheet Erosion Control	Acres	150
Streambank Stabilization	Acres	380
Stream Channel Clearing	Acres	450
Rehab. abandoned roads & trails	Acres	10,300
Mined Area Stabilization	Acres	10
Soil Surveys	Acres	1,450,000
Watershed Analysis	Acres	1,800,000
Fish and Wildlife:		
Big Game Range Analysis	Acres	320,000
Small Game Range Analysis	Acres	385,000
Wildlife Openings	Acres	3,500
Seeding and Planting	Acres	4,100
Release of Forage Plants	Acres	4,400
Planting Waterfowl Food Plants	Acres	40
Stream and Lake Surveys	Acres	15,300

The structural measures include: Construction of 12 miles of firebreaks for fire protection, 300 acres of surface waterholes for wildlife and potholes for waterfowl, 1,430 acres of developments and 6 special projects for recreation, and 585 miles of access roads and trails; improvement of 4,360 acres of streams and lake habitat for fish and wildlife; and acquisition of 128,200 acres of land.

Power

Provisions for meeting the electric power requirements in Water Sub-region E are described in Section II of this chapter. Present planning of the utility companies that supply this area are deemed adequate to provide the needs of the sub-region until past 1980. Planning by these companies to meet future demands until 1980 can be expected as the needs arises. As an example, the Alabama Power Company in mid-1969 announced plans to construct a large nuclear fueled generating plant on the Chattahoochee River in southeast Alabama.

Comprehensive studies are underway or authorized for initiation by the Corps of Engineers to determine the feasibility of further development of the water resources of the four major basins in the sub-region. These studies should consider the possible use of impoundments for supply of cooling water for thermal-electric installation. Some streams now have low-head hydroelectric installations which operate as run-of-the-river plants. The Tallapoosa River has two of these type plants. The use of pumpback peaking installations, to operate in conjunction with the thermal plants, are being considered in these studies.

Selected Plan

Figure 10-14 portrays the recommended plan of development for water resources in Water Sub-region E. The current program of water development, which can be assumed to be in place in 1980, is shown as "existing," while new proposals are in the "selected" category. Recommendations for further studies are outlined by area involved or by specific location if the area is quite limited.

A ranking of proposals by urgency of implementation is given below, to indicate the priorities for programming studies and construction. The priorities implied may be modified, when capabilities are considered and the effects of continuing investigations are added. Thus priorities indicate the current status of information and omit consideration of capabilities to implement studies or projects. The most urgent classification (I) should be given immediate priority and implementation. The second order of urgeny (II) implies implementation within about five years, while the third order (III) would be deferred for more than five years.

I - Immediate Implementation

Dalton Reservoir: should be immediately authorized and a schedule of planning and construction established at the earliest date.

Coosa River Navigation: should be immediately included in the Budget for advanced planning and engineering.

Yellow Creek Port Project (TVA): should be developed as described in Chapter 18 of Part III of this report.

The Tennessee-Tombigbee Waterway: funding should be expedited to insure completion of the project by 1980.

Continue investigations of:

Chattahoochee River Basin: continue with current studies under separate authority with emphasis on water supply and water quality control needs in the Atlanta area.

Alabama-Coosa River Basin: initiate studies of emergency needs for flood control, water supply, water quality, and other purposes.

Black Warrior River Basin: continue current studies under separate authority with emphasis on water supply and water quality control needs in the Birmingham area, water quality control needs in the Tuscaloosa area and local flood protection at Tuscaloosa.

Tombigbee River Basin: continue studies under separate authority for interim report for local flood protection at Columbus, Mississippi and, for full basin report, continue studies with emphasis on water quality control at Columbus, Mississippi, water supply at Hamilton, Alabama, and flood control in rural areas throughout the basin.

USDA Watershed Projects: development of Wahoo-Little River, (Headwaters Chattooga River in Alabama-Coosa River Basin area of Sub-region J) and Luxapalila Creek watersheds. These projects are recommended for early action under PL 566.

II - Implementation Within the Next Five Years

Flood Plain Information Studies at:

Georgia	Alabama	Mississippi
Dahlonega	Gadsden	Tupelo
Gainesville	Anniston	Fulton
Dalton	Talladega	Aberdeen-Amory
Calhoun	Childersburg	Corinth
Ellijay	Sylacauga	Iuka
Canton	Wetumpka	
Allatoona Dam to Rome	Centreville	
Rome	Port Birmingham	

Flood Plain Information Studies at: (cont'd)

Georgia	Alabama
Cedartown	Cordova
Rockmart	Tuscaloosa-Northport
Summerville	
Carrollton	

Lock replacement feasibility studies for the William Bacon Oliver Lock and Dam at Tuscaloosa, Alabama.

III - Implementation may be Deferred for Five Years, or Longer

Flood control and hydropower study of the Alabama-Coosa River Basin.

USDA Programs

Upstream Watershed Projects:

Wehadkee Creek, Alabama
Coahulla Creek, Tennessee (Sub-region J)
Line Creek
Mill Creek Area, Georgia
Mill Creek, Alabama
Jacks and Socapotay Creeks, Alabama
Dyne Creek, Alabama
Mahan Creek, Alabama
Little Sandy Creek, Alabama
Sipsey Creek, Alabama and Mississippi
Young Cane Creek, Georgia

The U.S. Department of Agriculture also has 27 watershed areas in the Tombigee River Basin under investigation as a part of their river basin study program. Information on these projects is contained in Appendix A, Table XXXE and their locations are shown in the Alabama and Mississippi maps in the Map Folio (Volume 2).

Land Treatment:

The U.S. Department of Agriculture recommends acceleration of land treatment and management programs on privately owned and National Forest lands to meet the most urgent needs by 1980. This acceleration will provide continued production of food and fiber and reduction of floodwater, erosion, and sediment damages. It will also increase outdoor recreational opportunities and improve the water and environmental quality of the sub-region. Priority will be given to critically eroding and the drainage areas above the

recommended and existing water resource developments of the States, Corps of Engineers, Tennessee Valley Authority and others to improve their efficiency and useful life. The recommendations were summarized previously in this section of the report.

Effectiveness of the Proposed Plan

The plan displayed here for Water Sub-region E was developed on the assumption that the counties and cities in Georgia, Alabama and Mississippi falling in this sub-region will be able, with the stimulation provided by the Appalachian Development Act of 1965 and related measures, to raise their economy to a level approximating the national level of economic development. For Sub-region E, this would mean a population of 4,851,000 in the year 2000 and 6,543,000 in the year 2020, compared with 2,491,000 in 1960. For employment, it would mean 1,846,000 jobs in 2000 and 2,515,000 jobs in 2020, compared with 842,000 in 1960.

The five elements of the plan consisting of Dalton Reservoir, Coosa River Navigation, Yellow Creek Port Project, Luxapalila and Wahoo-Little River watershed projects will have estimated annual project costs of approximately $13 million with estimated annual benefits, including regional expansion benefits, of approximately $230 million. The first cost of these five elements of the plan will be approximately $267 million.

The plan is not designed to have a uniform effect, but is specially designed to direct public and related private water resource investments to those communities and areas which have demonstrated the capability to grow, and, thereby, creating an opportunity to place investments where return on the public investment will be the greatest. Accordingly, the plan emphasizes the needs of regional growth centers where it seeks to remove the water related constraints to future increases in employment and productivity. While the needs of areas of demonstrated growth and those with clear growth potential are emphasized, the needs of all communities are given consideration in the planning process, for there is frequently a close connection between growth centers and the economy of the hinterland areas.

The plan selected is based on a careful study of the several alternatives available for providing the resources development required for sub-regional economic growth as an element in Appalachian regional growth as a whole. While Appalachian regional growth is a stated objective of the Appalachian Water Resources Survey, the selected plan does not ignore overall national interest in that it seeks to meet regional needs by means of a series of projects economically justified from the national point of view. Indices of project performance from both the regional and national viewpoint are presented for each major project and program recommendation.

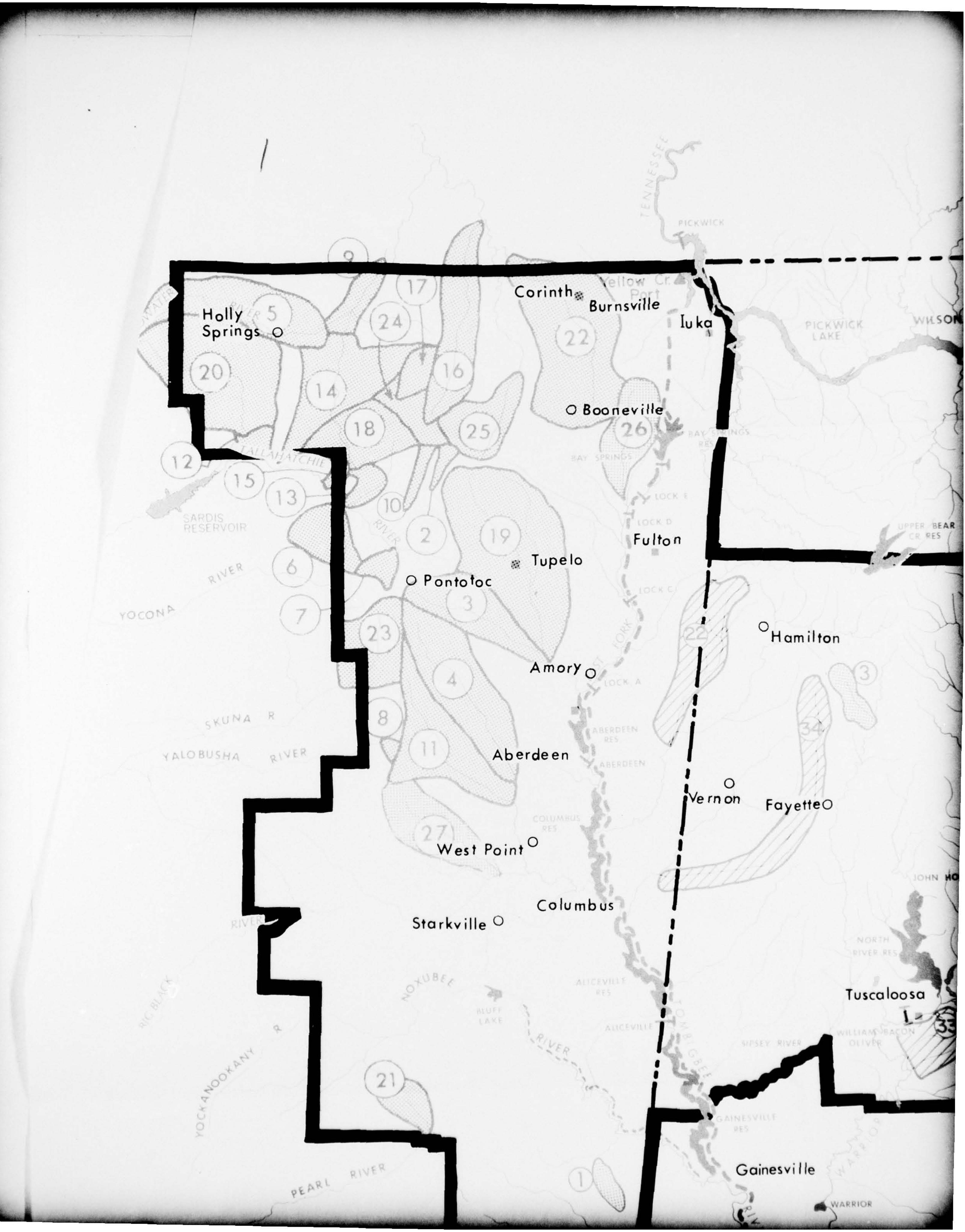
The effectiveness of the selected plan can be appraised, in part, by review of Tables 10-12, 10-14, 10-15, and 10-16 which indicates the magnitude of the needs which could be met by the several alternative approaches considered. In some instances, it is clear that further studies must be made to determine the best way of meeting sub-regional needs, but solutions have been found for most immediate needs and those expected to arrive in the early future.

Since the recommended plan overlays a continuing public and private program for water resources development, a definite statement of the marginal income contribution of the recommendations over the continuing programs is not possible. The definite project recommendations in Sub-region E are the same kind, and, in all probability, the same scale as would be forthcoming if PL 89-4 had not been enacted. The Act and this study may serve to accelerate the construction of recommended projects. A unique contribution of this study is probably limited to an overview of total needs and ways of meeting these needs; for example, a look at both water sources and distribution for the Cedartown-Rockmart area rather than the emphasis on sources or on distribution networks alone. Gains are in economy of planning, and a synthesis of system requirements rather than an emphasis on the individual increments of the system.

In the plan for Sub-region E, one principal reservoir project, Dalton Reservoir, and one authorized waterway project on the Coosa River are recommended for early construction. Funding for engineering, design and construction of the Tennessee-Tombigbee Waterway is also recommended, to assure completion of the project by 1980. Flood plain information studies are recommended for 27 urban centers.

Detailed estimates of employment and wage gain permitted by the implementation of the reservoir and waterway projects and their associated investment programs have been made. Increments of population and employment gains which could be associated with these projects total 133,000 and 52,000, respectively for Dalton Reservoir, Coosa River Navigation, and Yellow Creek Port. The same gains could be accomplished with other higher cost alternatives or substitution of "dry" for "wet" or "non-barge related" for "barge-related" industries might be possible if water supply and navigation needs cannot be met. Therefore, some question of defining the absolute net advantage of the plans in terms of income and employment is apparent.

Perhaps the best description of the effectiveness of the plan would be that: the plan (Definite Project Proposals and Future Studies) appears to be capable of meeting the water needs imposed by accelerating economic development of Sub-region E to the point that rough parity with the Nation in per capita income, in employment, and population growth, would be attainable by 2020. The proposals would appear to be practical and obtainable measures by which the water needs could be met. There are no obvious alternatives which are more efficient at this time.



Holly Springs
Corinth
Burnsville
Yellow Cr. Port
Iuka
PICKWICK
PICKWICK LAKE
TENNESSEE
WILSON
Booneville
BAY SPRINGS RES
BAY SPRINGS
LOCK E
LOCK D
Fulton
Tupelo
Pontotoc
TALLAHATCHIE
SARDIS RESERVOIR
YOCONA RIVER
LOCK C
UPPER BEAR CR RES
Hamilton
Amory
LOCK A
SKUNA R
YALOBUSHA RIVER
ABERDEEN RES
Aberdeen
ABERDEEN
Vernon
Fayette
COLUMBUS RES
West Point
Columbus
Starkville
JOHN
NOXUBEE RIVER
BLUFF LAKE
ALICEVILLE RES
ALICEVILLE
TOMBIGBEE
NORTH RIVER RES
Tuscaloosa
SIPSEY RIVER
WILLIAM BACON OLIVER
BIG BLACK
YOCKANOOKANY R
GAINESVILLE RES
Gainesville
WARRIOR
PEARL RIVER
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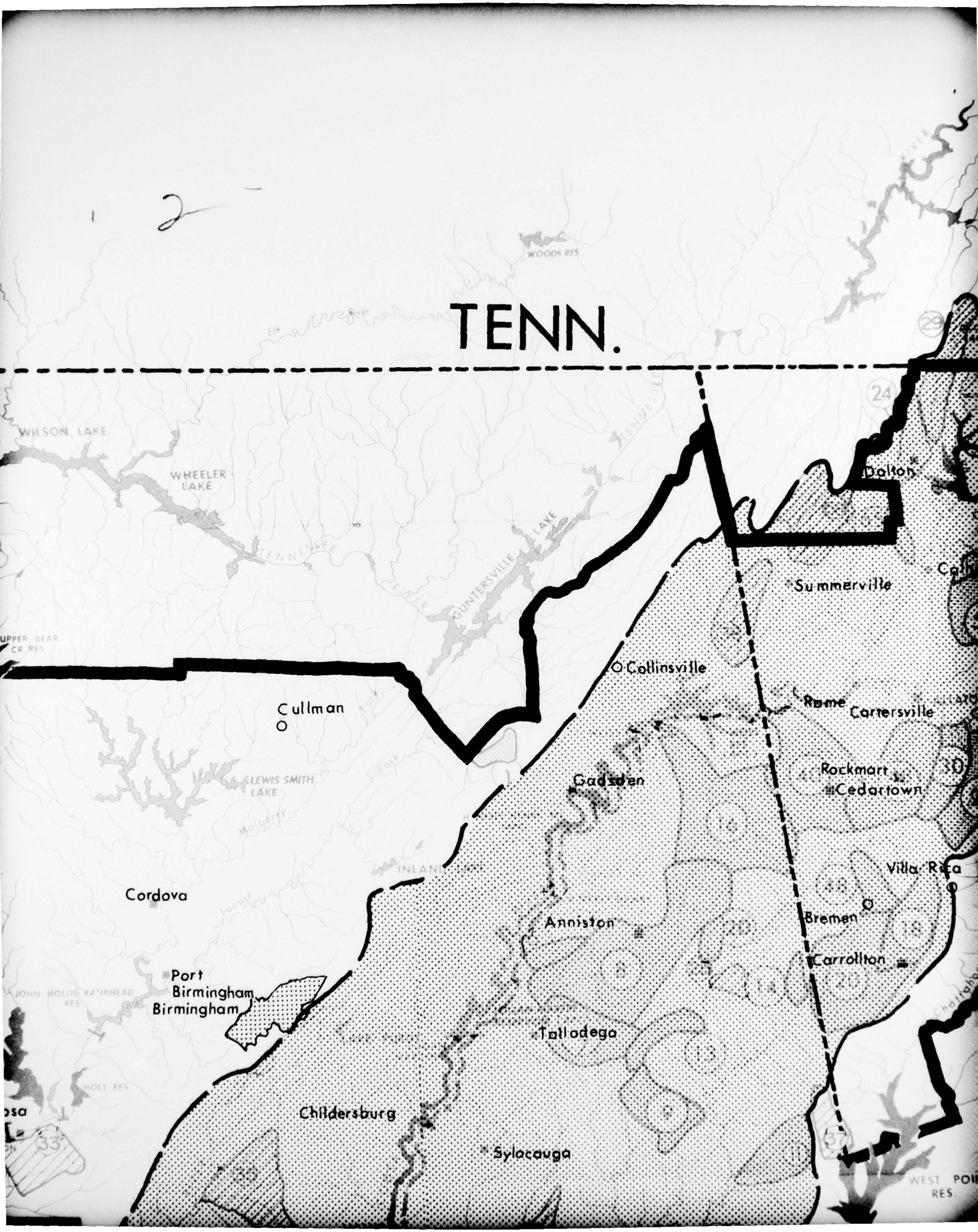

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TENN.
WOODS RES
Elk River
WILSON LAKE
WHEELER LAKE
TENNESSEE
GUNTERSVILLE LAKE
RIVER
UPPER BEAR CR. RES
Dalton
Summerville
Collinsville
Cullman
Rome
Cartersville
Rockmart
Cedartown
Gadsden
LEWIS SMITH LAKE
Mulberry
Villa Rica
Cordova
Bremen
Anniston
Carrollton
Port Birmingham
Birmingham
JOHN HOLLIS BANKHEAD RES.
Talladega
HOLT RES
Childersburg
Sylacauga
WEST POINT RES.
29
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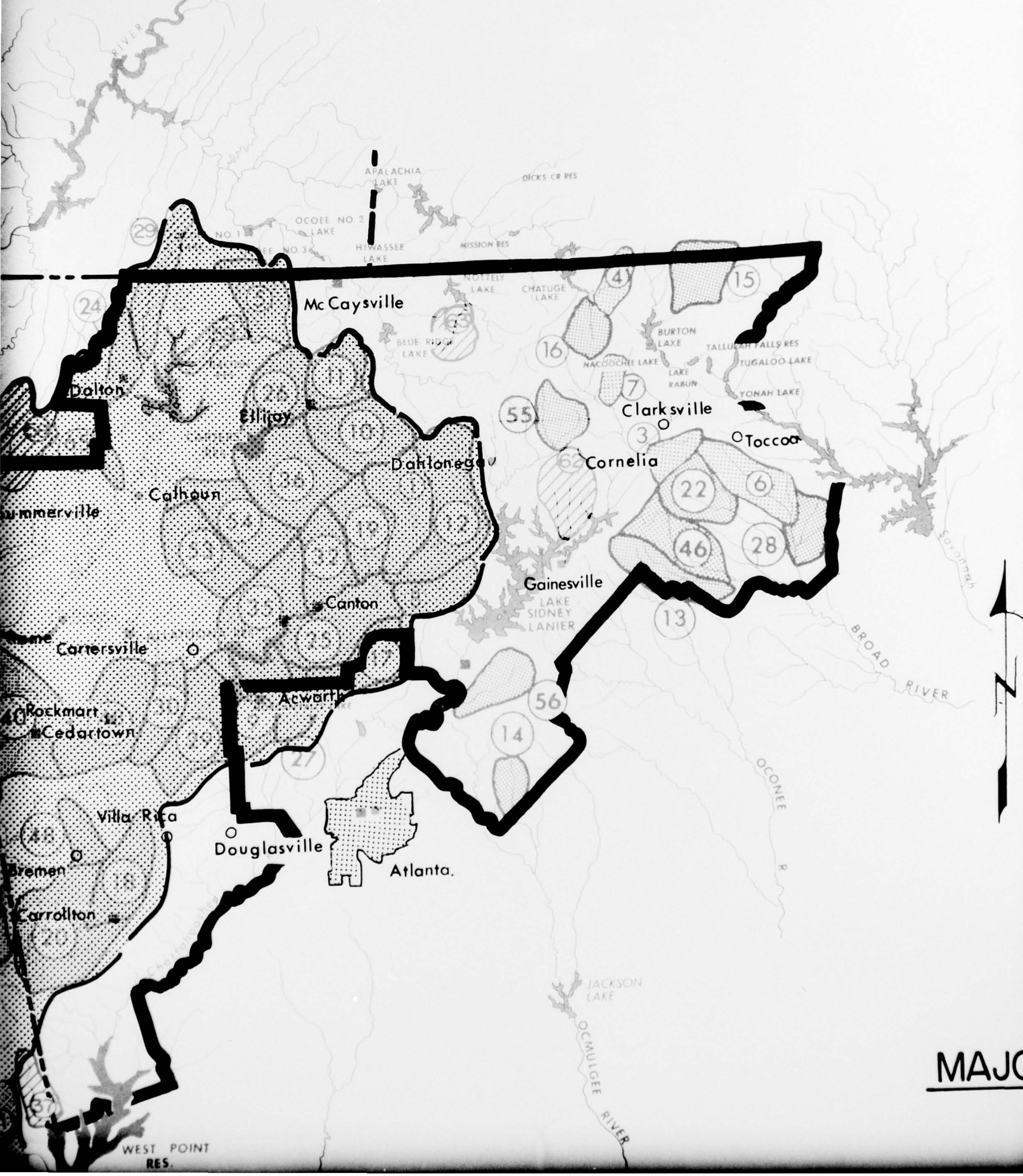
3



APALACHIA LAKE
DICKS CR RES
OCOEE NO. 2 LAKE
HIWASSEE LAKE
MISSION RES
McCaysville
NOTTELY LAKE
CHATUGE LAKE
BLUE RIDGE LAKE
BURTON LAKE
TALLULAH FALLS RES
TUGALOO LAKE
NACOOCHEE LAKE
LAKE RABUN
YONAH LAKE
Dalton
Ellijay
Clarksville
Toccoa
Cornelia
Dahlonega
Calhoun
Summerville
Gainesville
LAKE SIDNEY LANIER
Canton
Cartersville
Acworth
Rockmart
Cedartown
Villa Rica
Douglasville
Atlanta
Bremen
Carrollton
BROAD RIVER
OCONEE R
Savannah
JACKSON LAKE
OCMULGEE RIVER
WEST POINT RES.
15
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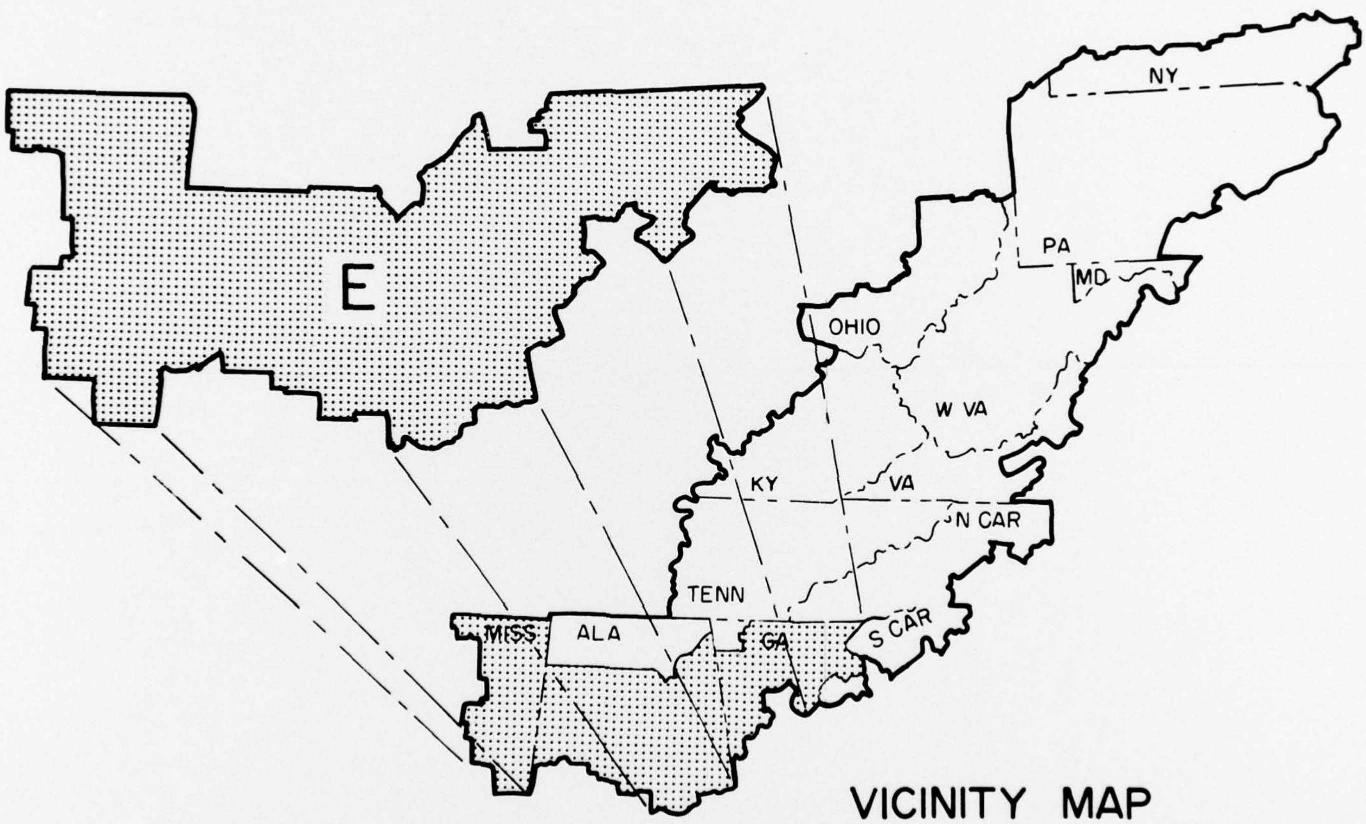
MAJOR

4

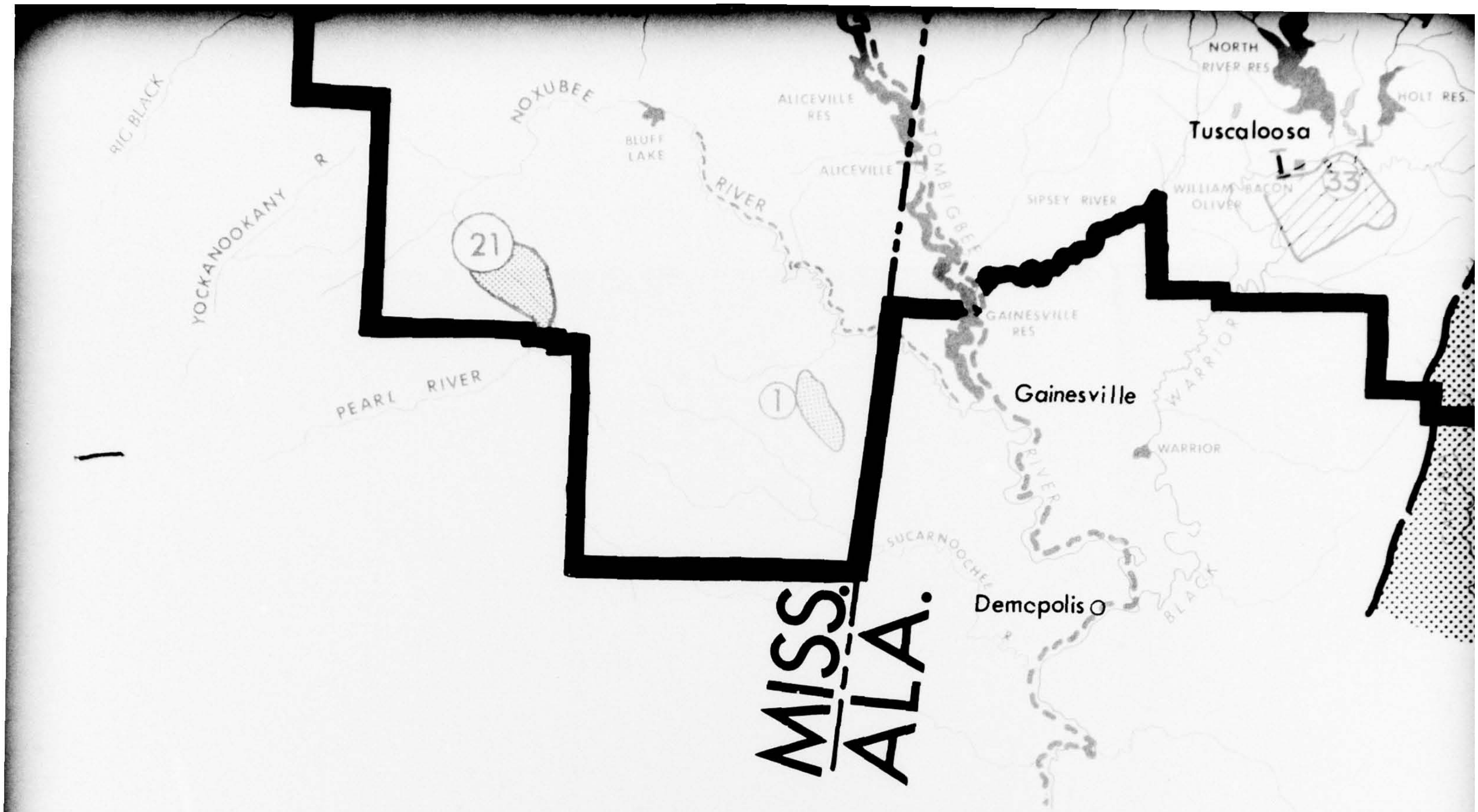


STRUCTURAL

UPSTREAM WATERSHED PROJECT

EXPECTED TO EXIST BY 1980 1/

FOR CONTINUING PLANNING



UPSTREAM WATERSHED PROJECT

EXPECTED TO EXIST BY 1980

GEORGIA

1. AMICALOLA CREEK
3. HAZEL CREEK
4. HIGHTOWER CREEK
5. JACKS RIVER
6. NORTH FORK BROAD RIVER
7. SAUTEE CREEK
8. SETTINGDOWN CREEK
9. ALLATOONA CREEK
10. CARTECAY RIVER
11. ELLIJAY RIVER
12. ETOWAH RIVER REACH
13. GROVE RIVER
14. HAYNES CREEK-BRUSHY FORK

15. HEAD OF LITTLE TENNESSEE RIVER
16. HIWASSEE RIVER
17. LITTLE RIVER
18. LITTLE TALLAPOOSA RIVER
19. LONG SWAMP CREEK
20. LOWER LITTLE TALLAPOOSA RIVER
22. MIDDLE FORK BROAD RIVER
24. MILL CREEK
25. MILL-CANTON CREEK
26. MOUNTAINTOWN CREEK
27. NOONDAY CREEK
28. NORTH BROAD RIVER
29. PUMPKINVILLE CREEK

30. RACCOON CRE
32. SHARP MOUN
35. STAMP-SHOA
36. TALKING ROC
40. BIG CEDAR CR
43. EUHARLEE C
46. HUDSON RIVE
48. LITTLE RIVE
53. PINE LOG TR
54. SALLACOA C
55. SUWANEE CRE
56. TESNATEE C
65. JOHN CREEK

ALABAMA

1. BRISTOWS CREEK
3. LITTLE NEW RIVER
6. BLUE EYE CREEK
7. CHEAHA CREEK

8. CHOCCOLOCCO CREEK
9. CROOKED CREEK
11. HIGH PINE CREEK
13. KETCHEPEDRAKE CREEK

14. LOST CREEK
15. MILL CREEK
16. TERRAPIN C
20. CAHULGA CR

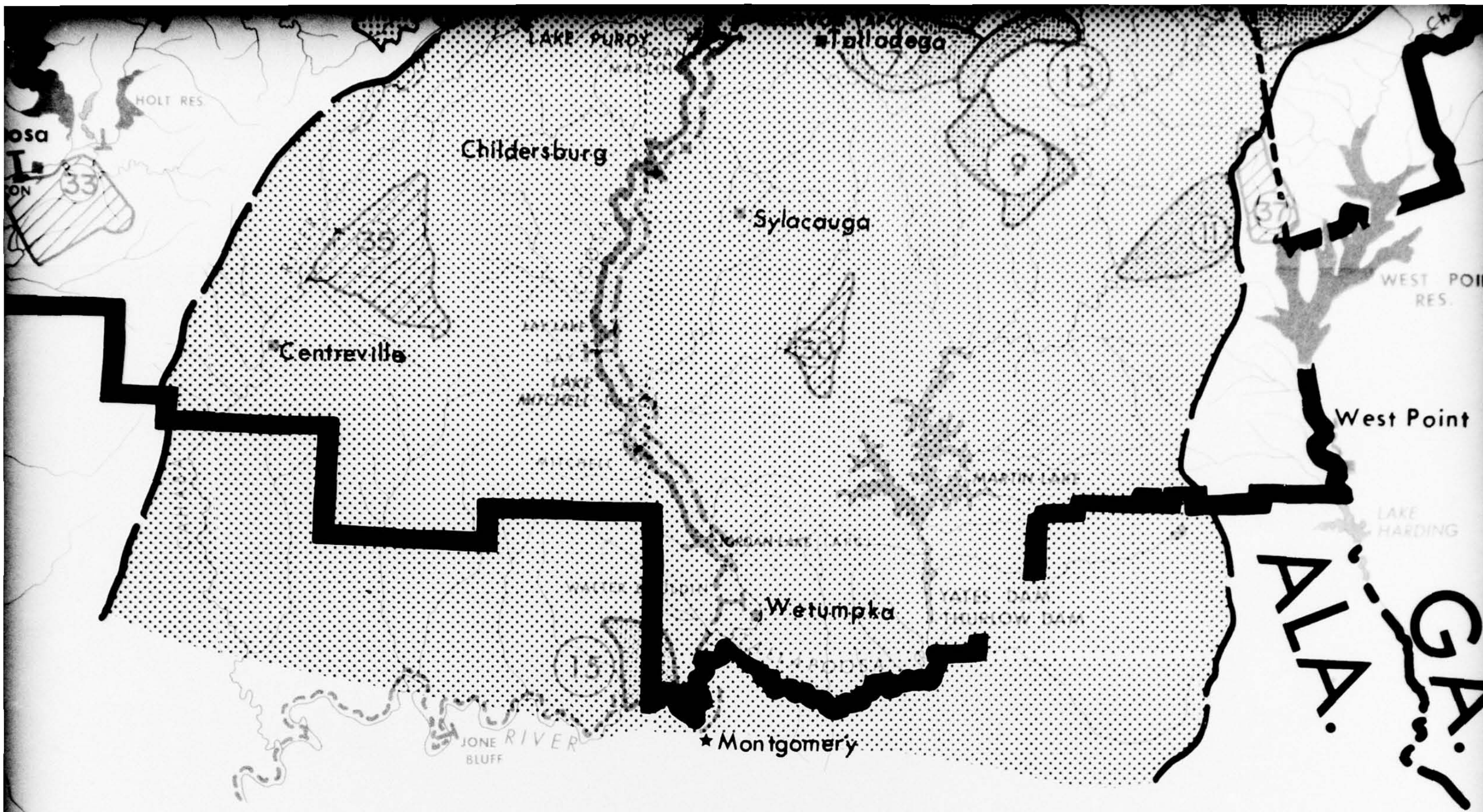
MISSISSIPPI

1. SHAMMACK CREEK
2. CANE CREEK
3. CHIWAPA CREEK
4. CHUQUATONCHEE CREEK
5. COLDWATER RIVER
6. CYPRESS & PUSS CUSS CR.
7. DUNCAN-CANE CREEK
8. FAIR CREEK
9. GRAYS CREEK

10. HELL CREEK
11. HOULKA CREEK
12. LITTLE SPRING-OCHEWALLA CR.
13. LOCKS CREEK
14. LOWER TIPPAH RIVER
15. MILL CREEK
16. MUDDY CREEK
17. NORTH TIPPAH CREEK
18. OAKLIMETER CREEK

19. OLD TOWN C
20. PIGEON ROOS
21. TALLAHAGA
22. TUSCUMBIA
23. UPPER SKUN
24. UPPER TIPPA
25. WEST HATCH
26. BROWN CRE
27. LINE CREEK

5



ED PROJECT IDENTIFICATION

FOR CONTINUING PLANNING 2/

RGIA

30. RACCOON CREEK
32. SHARP MOUNTAIN CREEK
35. STAMP-SHOAL CREEK
36. TALKING ROCK CREEK
40. BIG CEDAR CREEK
43. EUHARLEE CREEK
46. HUDSON RIVER
48. LITTLE RIVER
53. PINE LOG TRIBUTARY
54. SALLACOA CREEK
55. SUWANEE CREEK
56. TESNATEE CREEK
65. JOHN CREEK

58. HEADWATERS-CHATOOGA RIVER*
59. MILL CREEK AREA
62. WAHOO-LITTLE RIVER *
63. YOUNG CANE CREEK

TENNESSEE

29. COAHULLA

BAMA

14 LOST CREEK
15. MILL CREEK
16 TERRAPIN CREEK
20 CAHULGA CREEK
22. SIPSEY CREEK
28. DYNE CREEK
30. JACKS AND SOCAPOTAY
33. LITTLE SANDY CREEK
34 LUXAPALILA CREEK*
35. MAHAN CREEK
37. WEHADKEE CREEK
38. MILL CREEK

SSIPPI

19. OLD TOWN CREEK
20. PIGEON ROOST CREEK
21. TALLAHAGA CREEK
22. TUSCUMBIA CREEK
23. UPPER SKUNA CREEK
24. UPPER TIPPAH RIVER
25. WEST HATCHIE CREEK
26. BROWN CREEK
27. LINE CREEK

NO

1/

2/

* RECOMMENDED FOR EARLY ACTION

4

MAJOR RE

LOCAL PR

FLOOD PLA

FUTURE ST

NOTE:

1/ INCLUDES EXISTING ELEMENTS (SEE FIGURE 9-14 FOR DISTINCTION)

2/ USDA ALSO HAS 27 WATERSHED AREAS IN THE TOMBIGBEE RIVER BASIN UNDER INVESTIGATION AS A PART OF THEIR RIVER BASIN STUDY PROGRAM. INFORMATION ON THESE PROJECTS IS CONTAINED IN APPENDIX A, TABLE XXXE AND THEIR LOCATION ARE SHOWN IN THE ALABAMA AND MISSISSIPPI MAPS IN THE MAP FOLIO (VOLUME 2).

10 5 0 10 20 30 40 50

SCALE IN MILES

FOR CONTINUING PLANNING

JOR RESERVOIRS & NAVIGATION PROJECT

EXPECTED TO EXIST BY 1980 1/

RESERVOIR

LOCK & DAM

WATERWAYS

PORT

FOR CONSTRUCTION OR AUTHORIZATION

RESERVOIR

LOCK

WATERWAY

AL PROTECTION PROJECT

-- EXPECTED TO EXIST BY 1980

-- FOR CONTINUING PLANNING

NON-STRUCTURAL

OD PLAIN INFORMATION STUDY

- EXISTING OR IN PROGRESS
- FOR ACCOMPLISHMENT

URE STUDY

REPORT FOR
DEVELOPMENT OF WATER RESOURCES
IN
APPALACHIA

WATER SUB-REGION E

PLAN OF DEVELOPMENT

II-10-157

FIGURE 10-14